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Syllabus

NEW DIMENSIONS IN EDUCATION TECHNOLOGY

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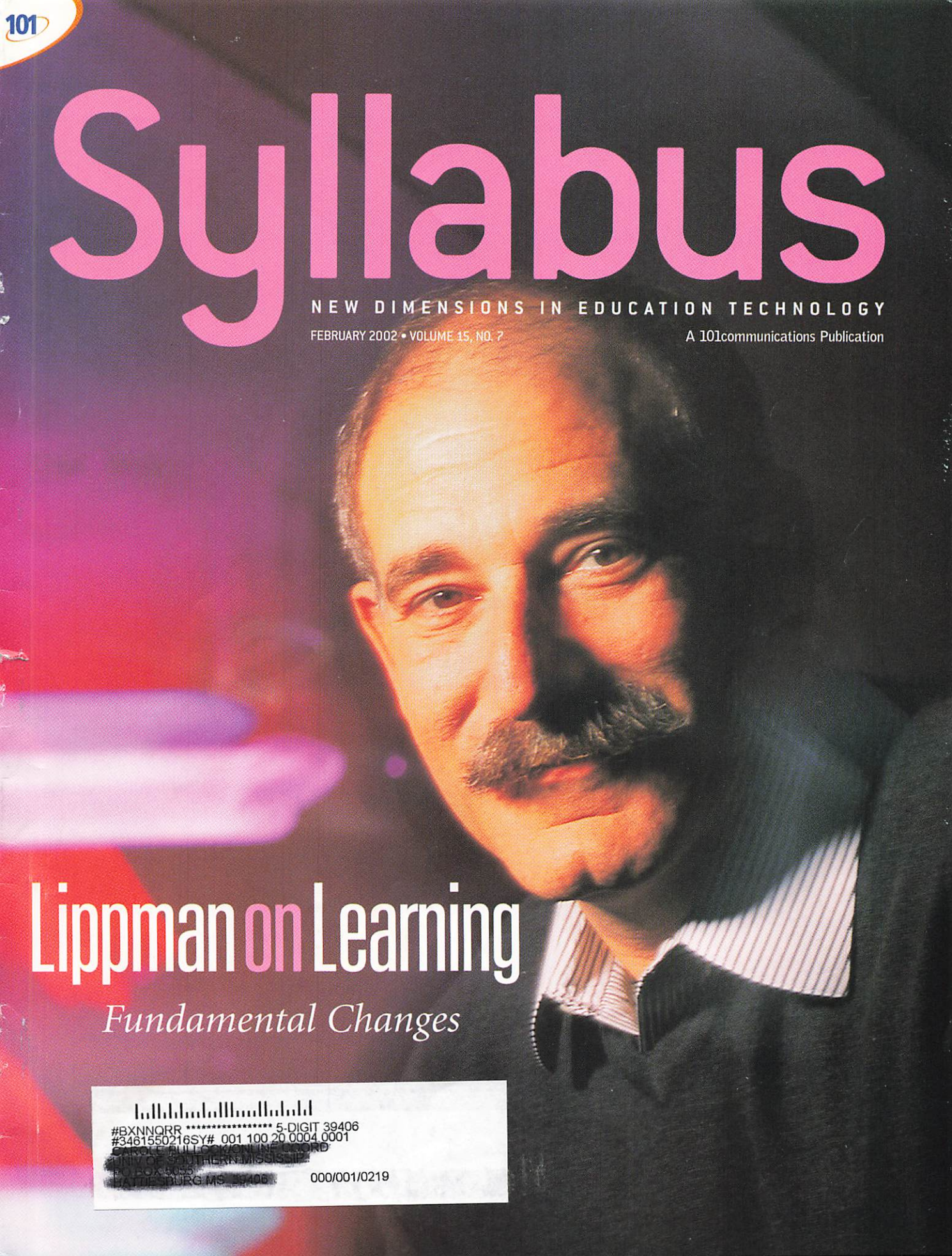

Lippman on Learning

Fundamental Changes

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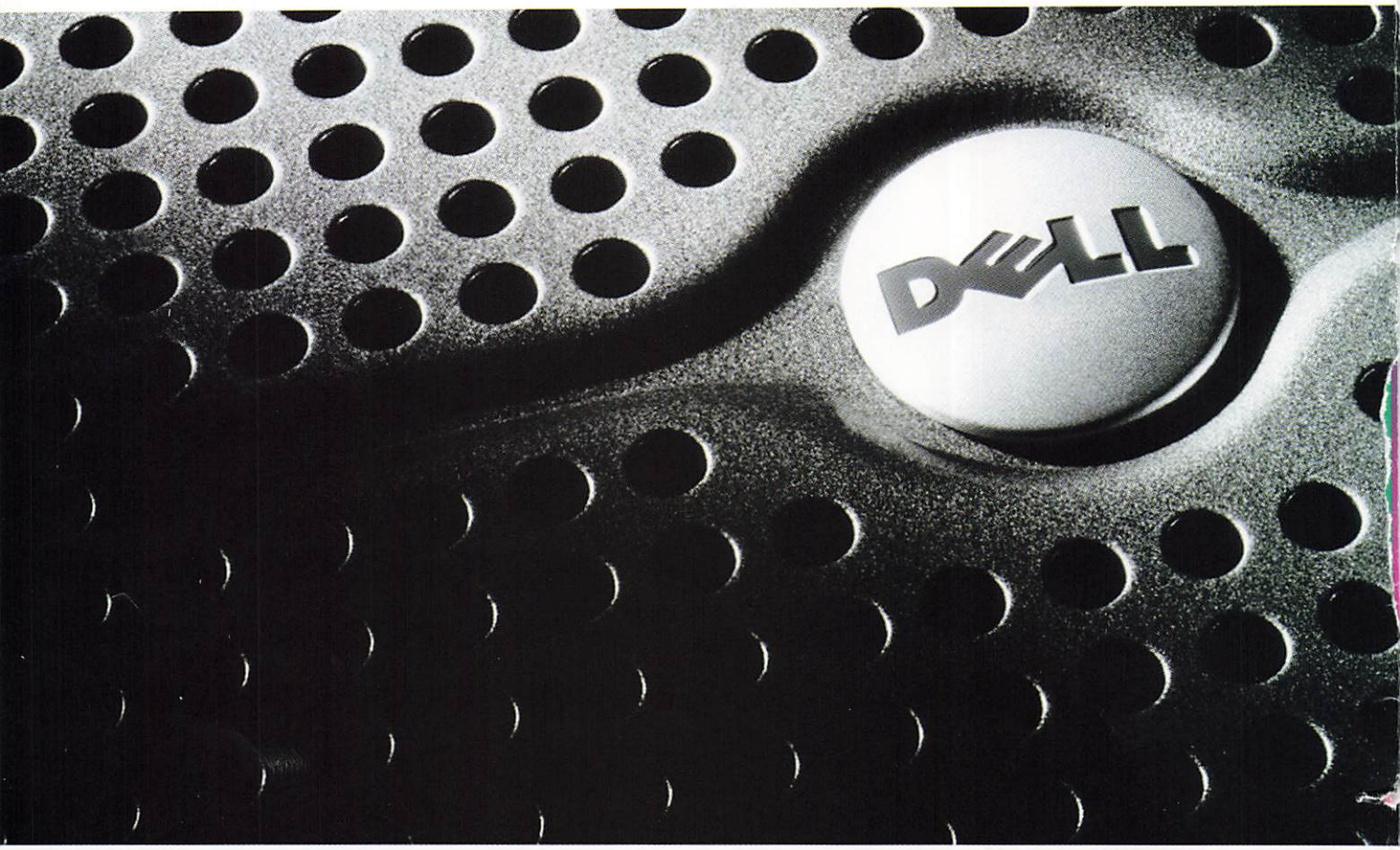

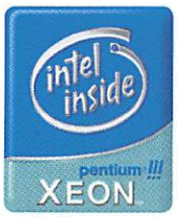

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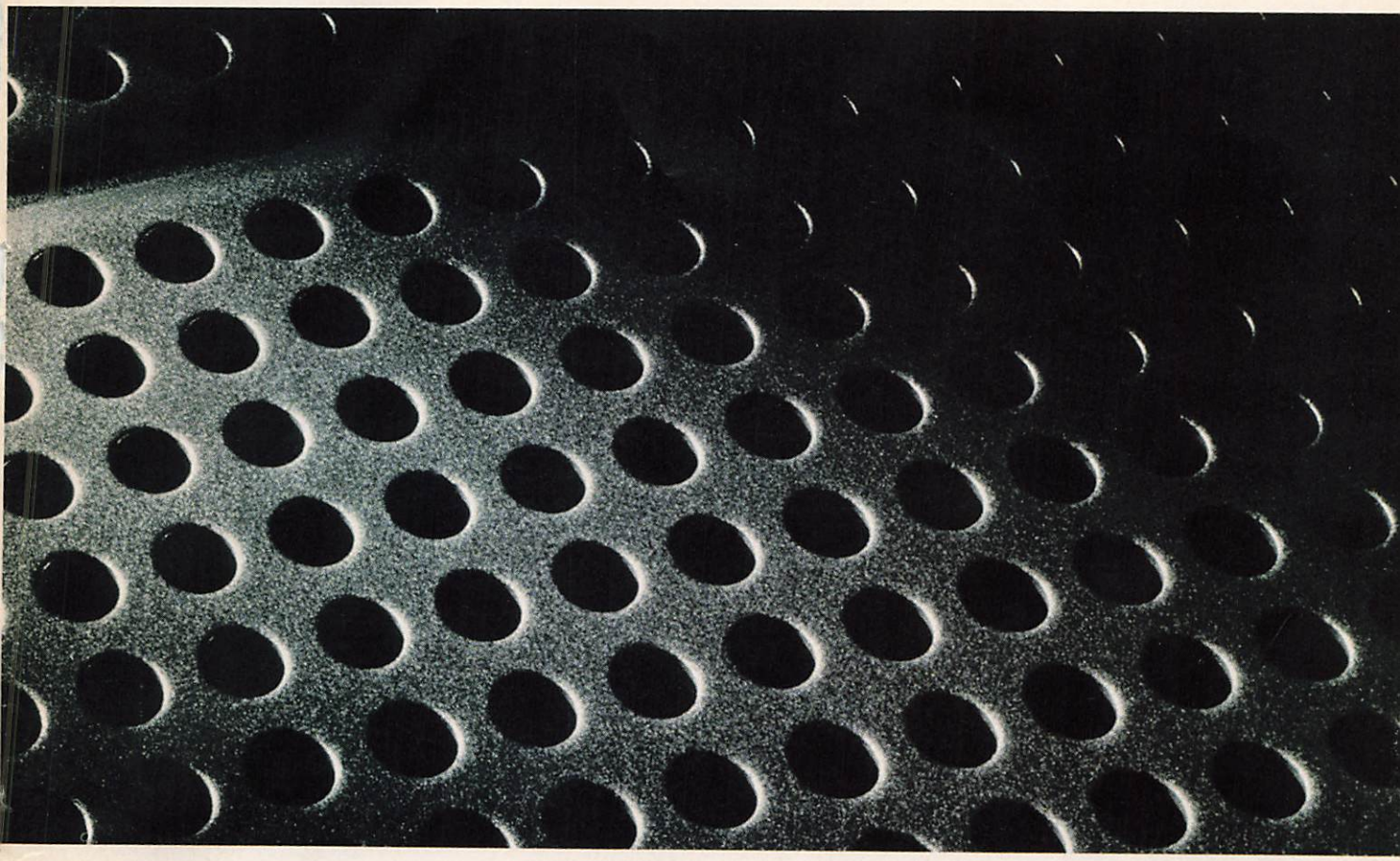

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EDITOR'S NOTE

Mary Grush, Editor

In this issue, our lead feature (page 12) is an interview with Andrew Lippman, founding associate director of the MIT Media Lab. At the Media Lab, Andy and his colleagues work daily with technologies that will impact the future, many of which may change our lives forever. He is an observer of the coupling of technology and society, and in the interview he shares some of his insights relative to education—and the fundamental changes that are already well under way.

Andy notes that we now have "the technologies that expedite individuality," and that it's possible to provide an environment in which students actively explore material in ways that are most meaningful to them personally. This relevance—and constructivist approach supported by technology—will also be important to graduates, who are likely to be changing careers several times during their lives and will turn to the university as a professional resource. Andy points out the potential of the melding of that group with undergraduates to pursue related goals. His example is in the area of auto mechanics, but there is no reason that this could not be extended to almost any discipline.

Colleges and universities will need to plan for technology that will help them reach and serve increasingly diverse student populations. Evan Robinson's article, "No Small Change: e-Commerce in Distance Education" (page 14), offers some practical advice about how e-commerce can help institutions extend their programs to new markets.

With all this change and increased use of new technologies, what will institutions do to offer technology support, both to students and to the faculty who must develop their courses with technology components? Two approaches are presented in this issue: "A Technology Support Model for Challenging Times," by Andrew Lawlor and Dennis Bradley (page 24), and "Faculty on the Move: Rethinking Faculty Support Services," by Mark Fink (page 27). Both of the institutions profiled in these articles have thoroughly examined their support needs institution-wide, and each has designed a program that emphasizes service to the people they define as their "customers" or "clients." Perhaps here again we're seeing changes that will "expedite individuality."

Planning is well under way for Syllabus2002, our ninth annual summer conference, returning to the Santa Clara Convention Center July 27-31. But we are still open to suggestions for sessions—and there are a few openings in some tracks and for certain session types. Although the deadline has officially passed, the Call for Papers will remain active on our Web site, www.syllabus.com. If you have a suggestion for a pre-conference workshop or seminar, or if you have a session proposal, especially in tracks 2, 4, or 5, you can still enter a proposal online. Do it soon! See page 31 for preliminary conference information, and visit SyllabusWeb for updates.

Enjoy this issue of *Syllabus!*

Mary Grush

Letters to the editor should be addressed to the editor and sent to 101 First Street, #605, Los Altos, CA 94022, or via electronic mail. We reserve the right to edit all submissions. **News and product information** will be considered for publication. Please send all materials to Paul McCloskey. If you are interested in writing for *Syllabus*, please send a brief description of your article idea along with writing samples to the editor at the above address.

Syllabus
NEW DIMENSIONS IN EDUCATION TECHNOLOGY

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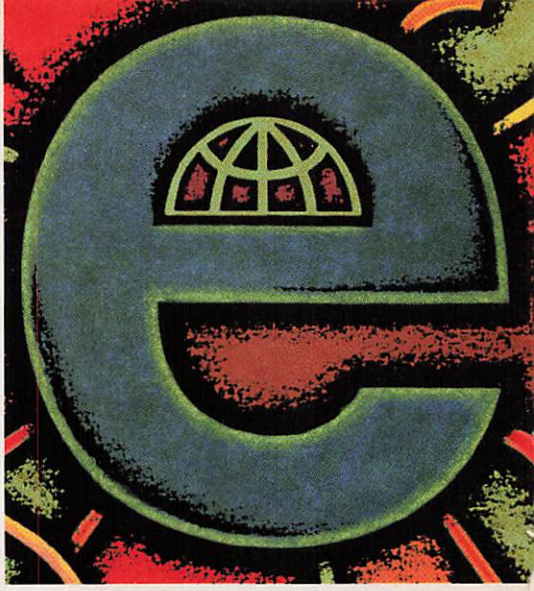

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Cover photo: © 2002 Paula Lerner

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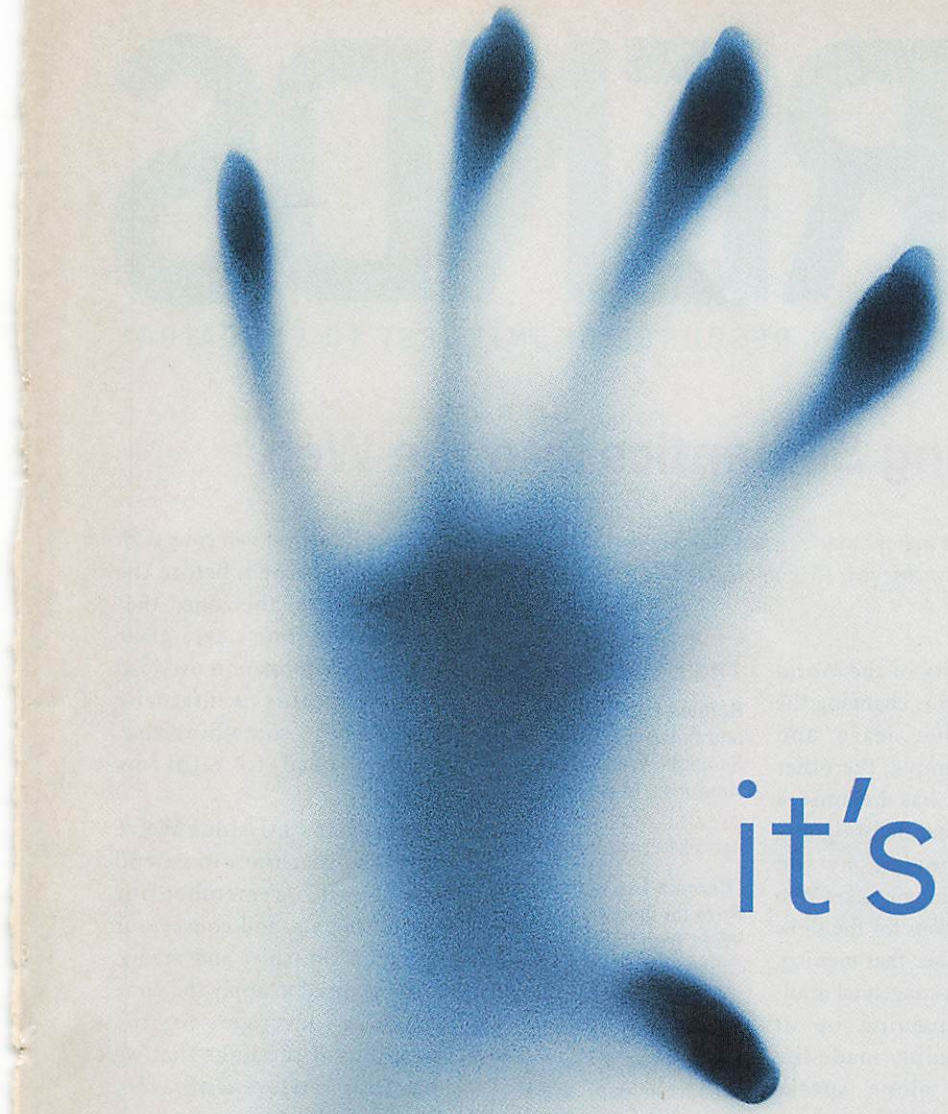

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Phillip D. Long

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TRENDS

AN INFORMATION RESOURCE OF INTEREST TO EDUCATORS

Briefs

- U.S. Customs Service agents seized computers at several prominent universities, including the Massachusetts Institute of Technology, the University of California at Los Angeles, Duke, Purdue, and the University of Oregon, in an effort to shut down what they claimed was a **global software piracy network**.

- Arizona State University's MBA High Technology program is equipping students with **Compaq Computer Corp. iPAQ Pocket PCs**, saying access to anytime, anywhere information is becoming a prerequisite for earning graduate degrees.

- Former Yahoo! Inc. vice president, general counsel, and secretary John Place was named executive director of **Stanford's Center for Internet and Society**, which focuses on how the Internet, law, and policy connect.

For these and other news stories, or to subscribe to the weekly Syllabus e-News, Resources, and Trends, visit www.syllabus.com.

Weaving Semantics Into the Web

What a tangled web we weave, when success our first hyperlinks achieved. (My apologies to Sir Walter Scott.)

The ubiquity of the World Wide Web is changing the way we live, learn, and teach. For example, the other day, in what has become a household ritual before going out to the movies, my son logged on to a movie ticket Web site to order tickets for the show we planned to see that evening. Why? Besides a congenital intolerance for queuing up at theaters, it simply made life easier. That alone speaks volumes for the Web's penetration in our daily lives.

The fundamental nature of the Web underlies its powerful simplicity. Anything can be linked to anything else. We experience this essential quality every time we execute a search with our favorite search engine. For example, as of this writing, a search for links to J.R.R. Tolkien generated about 650,000 hits from Google in 0.05 seconds. (Even Google doesn't seem to be sure when the numbers get this large!)

However, the links don't distinguish between a scribbled draft about the author and a published manuscript, between commercial spin-offs and academic scholarship, or among cultural references (Middle Earth's or any others), languages, or media about his works. That leaves the process of sifting through the returned morass to one's biological computer. With luck, something of interest will emerge in the first 20 or so hits returned, before the biological computer enters "the zone," that place where one's eyes glaze over with information overload and one begins to internally hyperlink to something else. ("Do I need to refill my coffee?")

So what's missing? We've invented machines to extend our muscles, remember our appointments, and convey our thoughts on paper and media. Now we need to apply the same machine leverage to the meaning of the links that we gleefully retrieve with every search. In short, we need to give our surrogates working on the Web the ability to comprehend what is meant by a particular connection.

Actually, work has been progressing on this topic for a number of years. Tim Berners-Lee, inventor of the Internet and most recently the recipient of the Japan Prize for 2002, has embarked on an extension of the Web called the Semantic Web. The goal of the project is to enable computers to share and process data as efficiently as people do. To do this, computers must have access to structured descriptions of information and inference rules that enable them to perform automated reasoning.

As it turns out, artificial intelligence researchers were working on systems like this to represent knowledge before the Web was a

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The Semantic Web

Berners-Lee, T., J. Hendler, and O. Lassila. "The Semantic Web." *Scientific American,* May 1, 2001. www.sciam.com/2001/0501issue/0501berners-lee.html

"Berners-Lee wins Japan Prize for invention of World Wide Web." MIT News Office, December 17, 2001. web.mit.edu/newsoffice/nr/2001/japanprize.html

Berners-Lee, T. "Semantic Web Road Map." World Wide Web Consortium, September 1998. www.w3.org/DesignIssues/Semantic

Miller, E. "Semantic Web Activity Statement." www.w3.org/2001/sw/Activity

World Wide Web Consortium. www.w3.org/TR/REC-rdf-syntax

The Semantic Web Community: www.w3.org/2001/sw/Activity

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Trends, *continued from page 8*

gleam in the eye of Berners-Lee. Such systems typically depend on centralized representations of meaning for overlapping concepts such as "parent" or "child of" in a genealogy application, for example.

Yet central control is the antithesis of the Web. Indeed, the Web has exploded even though people have claimed for years that without a well-organized central library of Web resources, no one would ever be sure of finding everything relevant to a search topic.

Any system for representing knowledge that is complex enough to be useful is also likely to encounter questions it cannot answer. *Star Trek* fans might recall the episode where Captain Kirk out-reasoned an intelligent computer that held him and his crew captive by providing it a simple riddle that was unanswerable. Developers of the Semantic Web aren't immune to the problem, but their solution is much more elegant: they simply accept that some problems will be unanswerable and move on. These exceptions must be handled gracefully, without smoke and melting integrated circuits.

Two technologies are being developed to provide logic to the Semantic Web. First, using Extensible Markup Language (XML), any Web author can create a set of descriptive tags to describe an object. But although XML can provide structure to Web information, what a particular author means by the tags must still be conveyed.

In the Semantic Web, meaning is conveyed by a Resource Description Framework (RDF). Using triples rather like the subject, object, and verb of sentence grammar, structured documents can make assertions about things (say "a person") having properties (such as "is an author of") with certain values (such as "a column in a magazine"). Unfortunately, we now have RDFs that can be generated by anyone, often with overlapping definitions for tags that, in effect, represent the same thing.

Enter ontologies. Philosophers refer to ontology as the science of what is, often synonymously with metaphysics. It refers to a document or file that formally defines the relations among terms, usually a taxonomy with a set of inference rules. Now we have a translator among different RDFs. Things are starting to get interesting.

As the power of the Semantic Web unfolds, actors will emerge that process the inference rules and read the meaning of documents to provide the biological computer with intelligent responses to inquiries or commands. These actors, or software agents, will exchange information among themselves as they reason for us.

Marvin Minsky once remarked that in the future, we'll look back and think how strange it was that books we brought home to put in our personal libraries didn't talk to one another, exchanging information on their topics, their authors, and who they referenced. It makes sense, of course, that the new book would add itself to our personal catalog, modify our interest profile, and broaden our personal knowledge base. The work in the Semantic Web is a small step in that direction. At the very least, it should eliminate the infamous "Error 404: Not Found" message, replacing it, perhaps, with a question about what we really intended to find.

Digital Rights Management

INDECS (Interoperability of Data in E-Commerce Systems)
www.indecs.org

Semantic Web News

XML News
www.xmlnews.org

PRISM
www.prismstandard.org

RDF Site Summary
www.purl.org/rss/1.0

Vocabularies for Distributed Online Learning

The Dublin Core Metadata Initiative
www.dublincore.org

IMS Global Learning Consortium
imsproject.org/rdf/index.html

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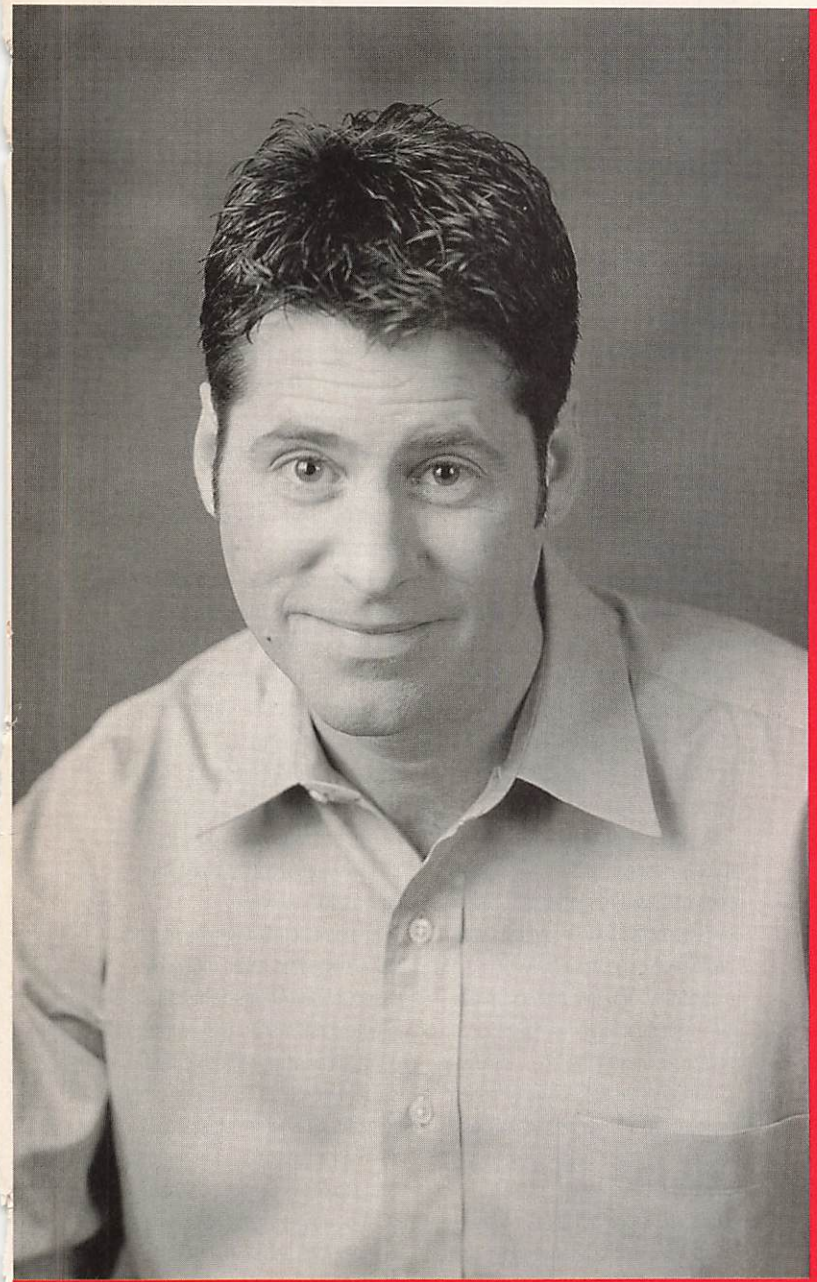

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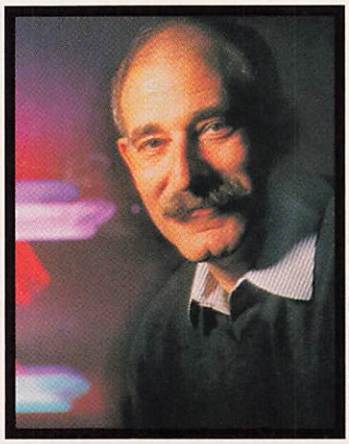

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Lippman on Learning

FUNDAMENTAL CHANGES

Syllabus interviews Andrew Lippman, founding associate director of MIT's renowned Media Laboratory, to explore how technology will transform our notions of teaching and learning.

S–Many students are going off to college with laptops, cell phones, and handhelds. Will these mobile devices be useful for educational purposes? Will they be used more for socialization?

AL–We spent ten years thinking about whether kids should have calculators in class or not, and you know what? It is ten years later and we don't even think about it anymore. It is just part of your life to have those things. I think they are things you are just not going to think about. They will be as much a part of your life as a pencil as time goes on.

Almost anything that you can carry around and use at your command is in some way useful for education, if only as a reference. In the case of these active devices, their main impact is that they shift control of knowledge from the teacher or classroom into the hands of the student. This is a shift that has been going on in spite of the educational establishment for the past 20 years, and now it is unavoidable. But more important, these are not just portable dictionaries, they are active and connected resources.

Consider by analogy a hand-held [Global Positioning System] versus a book of maps. The latter is consultative, while the former engages you in navigation in new ways. Now, extend that GPS into a programmable environment, and suddenly one person will insert the place into his e-mail, another will sort information by location, and yet a third will leave reminders for the next visitor to a specific place. In each of these cases, the student has re-invented positioning in imaginative ways that go well past the expectations of a navigation class.

We cannot deny the socialization aspect of some of these communications devices. The adoption curve of short messaging in the UK—from 10,000 per month after introduction to 1 billion messages sent in the last year—shows that simple interactions go a long way. I expect that it won't be long before rote questions on tests are answered the same way that the "lifeline" is used on the Millionaire television quiz show: you will get a communal answer.

S–What do you think about "student-centered" education, and about the ideal of lifelong learning?

AL–I consider myself more of a researcher than an educator, so quite naturally I believe that being engaged in research is the best way to learn. It also may be the best way to re-think the dichotomy between pupil-centered education and its alternatives. Further, equating research with learning transforms education into a lifelong experience almost by definition.

Tom Magliozzi, MIT grad and co-host of the *Car Talk* [National Public Radio] program lectured in one of our classes and noted how we seem to do education backwards: we teach kids techniques before they have any appreciation for what use those techniques have and before they have any personal meaning. That is a recipe for segregating school from life. His answer was to do it the other way around: first work, then learn as you need to.

The point is that learning is a natural activity that takes root when you do it yourself and when there is an emotional reason to be attached to the knowledge. Whether that is "student-centered" or the result of an inspired lecturer is less important than engendering the notion that learning is continuous, natural, and fun. As [Seymour] Papert has said, perhaps hard fun, but fun nonetheless.

S–Why wasn't it that way in schools in the first place?

AL–Who says it wasn't? It seems clear that we transformed education into mass production at around the time we invented mass production of industrial goods. Perhaps at the time,

it was sufficient to learn the three "Rs" in order to lead a useful life, perhaps it was just the mass number of people that had to pass through the educational mill. In any case, when we democratized learning, we lost something as well as gained quite a lot.

The problem is that we now require more than basics in order to function in society. The jobs are more intellectually challenging, and the terrain is shifting too rapidly. You won't work in the same job for a lifetime almost no matter what you do.

We have the technologies to expedite individuality again. The real question is whether we can transform the teaching environment from factory work to tutoring. That is a complicated social and personal issue.

S–For a long time, we have had libraries that have a very specific way of keeping track of information, and now suddenly we have so many different sources and kinds of formats—you can grab information from just about anywhere. How is this going to evolve?

AL–My sense is that things will not be as random, anarchic, and disruptive as we fear in that regard. Three years ago, the answer would have been different. Three years ago, the answer would have been yes, you are going to get overwhelmed with all kinds of bits and we better invent things like agents, validators, and so on that separate the signal from the noise. Or a living, trusted community might do that. You will end up going to sources that are recommended to you by others. Maybe we can build indexing systems that can grow as quickly as the amount of information that needs to be indexed, and so in a sense, what happens is the things that get corroborated rise to the top and the things that are outliers will sort of be off on the tail and get canceled out. This might have been the answer three years ago.

I also think that there is another flywheel that we are not taking into consideration. That is the general flywheel of society, that we don't overturn traditional institutions as quickly as the technology allows. In reality, we have another generation where the *New York Times* is going to be the newspaper of record and not Matt Drudge. There will be a paper of record, and the library is going to be the repository of record, and those institutions will in a sense be what really does it.

S–Some of the technologies you work on at the Media Lab may ultimately be used in education environments. They may be quite radical departures from traditional education, such as immersive environments. How do you know that those technologies will be effective for education?

AL–For the sake of this question, there are two kinds of endeavors that go on in laboratories like ours. One is those that are specifically targeted toward use and learning. They are investigated, tested, tried, and explored in learning environments. The issues of whether they are effective or whether they are worthwhile or ethical are while not solved, at least pursued in the same vein that one would pursue anything else in that kind of targeted world.

There is a theory of learning that pervades the media laboratory and the theory is one that really derives greatly from the guidance of Seymour Papert, and that is that learning is the province of the learner, it is the constructive exploration that an individual does. Education is a question of providing the resources by which you do that and the motivation. That is one of many educational theories or learning theories if you will, and so that is the one that we explore. If you don't buy it, then you sort of shop elsewhere.

But far more interesting is the rest of the work: that which goes on independently of any specific education goal. This is where the real surprises come from. For example, the insight that avatars can engage kids in storytelling and expand their ability to think and create, or that a network of sensors can allow a kid to send a dance step as e-mail, or that watching television with friends who you see through an online connection can help explore the material. We don't know how these ideas will be used, so we let kids of all ages try them out.

S–You've said that distance learning doesn't scale. Is that correct?

AL–It doesn't scale because it can't include the experience. It is hard to wholeheartedly fall in love with distance learning because the truth of the matter is, there is a chemistry involved in being in the place. There is just no way that you can match that chemistry through any kind if wire. However, as Duderstadt notes, the current university system doesn't scale so well either! So, it may be the best that some people can do. Personally, I would rather explore a different solution that moves the school into real life.

For example, in Maine, there is a network of colleges, and a similar network of graduates. Suppose the classroom exercises in automobile mechanics were problems contributed by the alumni and worked on jointly with the enrolled students. Not only would that bridge the distance, it would probably increase the endowment.

S–Is the rate of technological change going to out-pace efforts to introduce learning technologies around the world?

AL–The truth of the matter is, change is faster today. The reason is that the rate of change of society is a function of the age at which you gain access to the dominant technology. The entry-level age for computing and communications is 2 to 4. So, at least in North America, kids are now learning their stuff by 4 years old.

This has two implications that are relevant here. First, the educational environment is no longer fixed and stable. It is evolving faster than the rate of turnover of teachers or educators. Therefore, the nature of the profession and the workplace will change whether we like it or not. It is a mistake to think of this as introducing learning technologies—it is a matter of keeping up with the learners.

Second, it makes it that much more important to diffuse these technologies throughout the rest of the world. People need to be versed in the dominant technologies of the day early or they will not do it at all. When the industrial revolution began, the farmers didn't get new jobs, their kids did. Perhaps we need a "bit corps" equivalent to the Peace Corps of the 60s.

S–Given that, are we headed for very fundamental changes? Or do we just need to make adjustments along the way?

AL–I think that we are at the cusp of a real change both culturally and societally. This is not just a technology change; the Net is not just a telephone system that talks to computers, nor is it just something that works better than the phone system. We are using communication networks that are fundamentally different from any other communication systems that we have ever had before: they connect groups and social structures. This is something that we don't understand and exploit. But it is worth trying to think about and understand. That is what the next five years is all about. Bringing communications to the world.

No Small Change: e-Commerce in Distance Education

By Evan T. Robinson, Shenandoah University

With online courses so widely distributed outside the institution, it is increasingly important for distance learning programs to be able to support themselves. e-Commerce can help.

Higher education is undergoing rapid and constant change. One area of tremendous evolution is distance education. The resulting competitive environment necessitates that programs take the time to develop comprehensive plans to approach the marketplace, allowing for flexibility, modularization, and the opportunity to generate revenue as well as make a profit. In that respect, the education provided as distance education may be viewed in the context of "knowledge as commodity."

The increased use of the Internet is opening up new markets and allowing for a variety of learners or consumers to access materials previously unavailable to them. Advances in technology are providing faster computers, increased bandwidth, and wireless access. The Internet is more affordable, accessible, and faster than ever before.

Trends like these have made online ventures attractive as a source of business and revenue. Within higher education, one manifestation of this is distance education. The key is to take online materials developed for one audience and then repurpose them into different sized offerings and into different markets, using the e-commerce concepts of either business-to-consumer (B2C) or business-to-business (B2B) models.

For the purpose of this article, e-commerce is defined as any e-business initiative that is focused around individual business transactions that use the Internet as the medium of exchange, including B2B and B2C transactions. B2B models involve the sale or exchange between two business entities, while B2C transactions are those in which the customer is the end user.

Relating e-Commerce to Distance Education

When relating e-commerce to distance education, it is important to take the business approach and start with a business plan and a business objective. Some business objectives include the development of an appropriate marketing plan, realistic financial projections (revenue and expenditure), planned programmatic growth (increase or decrease), planned environmental scans for alternative markets and competition, and financial modeling to include student attrition.

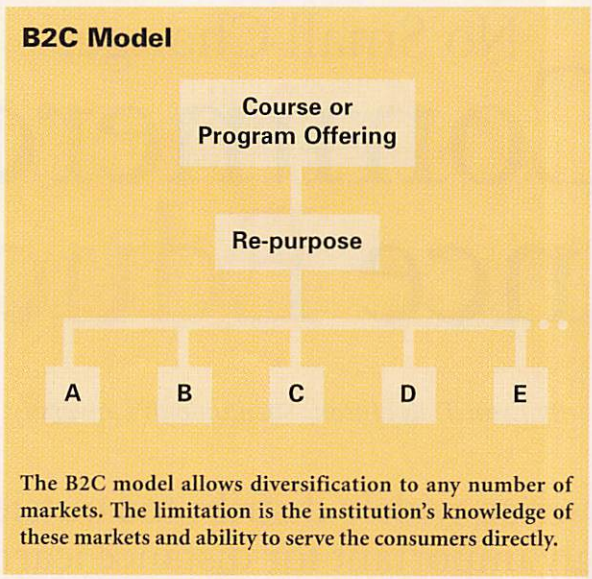
E-commerce presents an opportunity for programs offering distance education to access a variety of potential

Illustrated by Christopher Baldwin

audiences of learners. Additionally, e-commerce is about developing an online presence as well as improving operational efficiency, which can be done by optimizing the use of digitally developed materials. This can be discerned in the types of e-commerce relationships developed (B2B or B2C) as well as utilizing the Internet to attract or retain learners.

Entering the Marketplace

It is important to begin the planning process with the intent of both pedagogical and financial success in mind. This means entering the online marketplace only after appropriate planning and preparation have taken place and based upon the knowledge that your institution has some offerings that can be competitive. Entering the competitive marketplace of distance education should be done based on a sound understanding of the institution's capabilities and the product(s) that can be effectively delivered, the competition, the potential market(s), and financial accountability. At each step of the planning process, the institutional leadership should focus on developing a specific product for a specific market while considering potential secondary markets within the business plan, but not as a part of the initial offerings.



The B2C model allows diversification to any number of markets. The limitation is the institution's knowledge of these markets and ability to serve the consumers directly.

Understanding the Institution's Capabilities

Entering the distance learning market just because others have it is not a decision based on a sound understanding of the market, but instead is a reactionary decision made to appease or mollify some constituency. Appropriate planning is necessary to prevent "Fire-Ready-Aim" program development. A planning pitfall, however, is going through the correct steps but basing market entry on the misguided notion that distance education provides a financial windfall. Some estimates indicate that as many as 40 percent of independently developed online offerings never break even. Finally, it is necessary to circumvent the academic inertia that results in some decisions taking so long that the reality then becomes "Ready-Ready-Aim-Aim-Fire"—and a missed window of opportunity.

Prior to or during the evaluation of potential offerings and audience for distance education, an institution should ensure that a sound infrastructure is in place to deliver the offerings. Of paramount importance is getting it right with the first offering and not trying to do too much. Walk before you run. Plans should include consideration of how the infrastructure (faculty, staff, central administration and support services, software, hardware, etc.) would support entering into tangential markets over time.

Part of understanding the institution's capabilities as well as the competitive environment might be explained by the teachings of Sun Tzu. As stated in *The Art of War,* "If you know the enemy and yourself, you need not fear the result of a hundred battles. If you know yourself but not your enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle."

Knowing the Competition...and Yourself

Consider the relevance of Sun Tzu's comments when entering the competitive arena of distance education. First, knowing yourself can only be accomplished by taking a realistic look at the institution's capabilities to deliver quality online offerings as well as knowing how those online offerings can be stratified into various markets, both B2B and B2C. Knowing yourself also means being aware of your institution's financial position and needs as well as the support of the administration and faculty for these types of ventures. Knowing the competition relates to understanding not only whom you are competing with, but also what markets they serve, how well they serve them, and getting a sense of their future plans. Examples of how to evaluate the competition may include visiting their Web site; collecting relevant data via marketing correspondence, word-of-mouth, trade shows, and meetings; and reviewing different recruitment forums in which you can monitor a competitor's open and new positions.

The Potential Market(s)

It is important to start distance education offerings with a strong understanding of the marketplace, which in some instances means focusing on one or two particular target markets. When the time comes to diversify, the B2C application relates to the "knowledge as commodity" approach as applied directly to the end user, in this case the learner. The learner can participate in various types of offerings, ranging anywhere from an entire program of study to continuing education and lifelong learning courses. This could involve direct, target marketing to the learner for whatever the offering should happen to be or to a general population. Consider the example of an online program for registered and practicing pharmacists that allows them to upgrade their skills and degree. The reason for developing multiple B2C markets over time is to provide multiple means of generating revenue.

Next, take the same distance education offering developed above and apply a B2B model to it. It should be possible to see

a market diversification model for distinctly different markets. The offering developed for direct-to-consumer use can be sold either in its entirety or piecemeal to another college or university who brokers the content to a third party. This arrangement allows another institution to provide distance education to its constituents without having to develop the full infrastructure necessary to do so. It can also be a very quick means of entering a market and derives an alternative source of revenue for the institution based on its initially developed offering. Payment for the content can be structured in a variety of ways.

Sound Financial Models

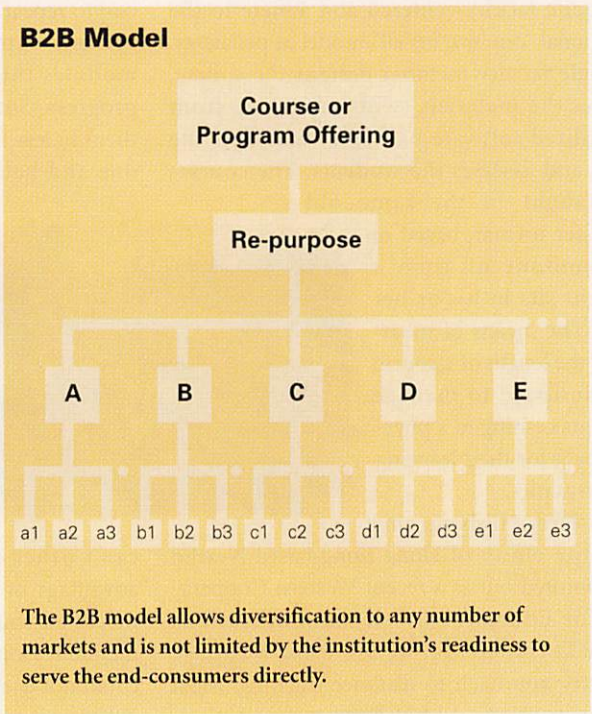
The development of distance education offerings can be expensive and lead to financial challenges. For this reason, it is imperative to consider any and every means by which these offerings can be re-purposed into various markets. This will improve the return-on-investment for product development, delivery, revision, and infrastructure support as well as provide increased revenue and subsequently lessen dependence on a single market.

The B2C model is a direct fee-for-service arrangement between the institution and the learner. The key to this model is diversifying the offerings in order to provide several revenue streams. One way to accomplish this is to develop distance education offerings at the largest programmatic level that the institution's resources will permit, and then determine how that can be split apart and sold in various units to various markets.

Consider as an example a 45 credit hour, two-year-long, online, non-traditional pharmacy program marketed to registered pharmacists seeking to obtain their doctor of pharmacy degree. This program could be broken down into macro certificate programs, small-scale certificate programs, or continuing education, each of which could be sold directly to the learner both within the same large-scale market of pharmacists or to specific target markets of the population of pharmacists. The use and subsequent re-use of the materials to a variety of learners allow the cost of developing the distance education offerings to be spread over multiple markets and increase the chances of generating a profit. As stated earlier, it minimizes single-market dependence and provides the learner (consumer) with various pricing structures that may better serve their needs. The key is to minimize or eliminate the financial problems that can result over the long term.

Now, take the same non-traditional doctor of pharmacy program and apply a B2B model to it. It is possible to see a distinctly different model regarding the potential clientele as well as the financial modeling. Within a B2B model, the non-traditional doctor of pharmacy program is sold either in its entirety or in pieces to another college or university. In either case, the contractual arrangement can be structured to allow for either a lump-sum purchase of the content or a revenue-sharing arrangement where each party gets a set percentage of the tuition generated.

The second revenue model allows for continuous income over the life of the contract and control over the content sold, which has significant advantages. An example of this is selling the content to another institution, contracting for 45-55 percent of all revenue generated, and doing no more than providing the content and assessment components of the program. All other services—from admissions, to library, to student advising—are provided by the purchasing institution.



The B2B model allows diversification to any number of markets and is not limited by the institution's readiness to serve the end-consumers directly.

Combining both the B2C and B2B models will place the institution in the best position to ensure that adequate revenue will be generated to support the institution as well as provide the financial basis for continued improvement and new program development. There is a caution to diversification, however, and it relates to ensuring adequate staff to administer the various types of offerings. Appropriate staffing levels need to be considered prior to entering into any type of re-purposing venture.

Taking Interest

As institutions seek new and innovative ways to remain competitive and cope with the changes taking place within higher education and the marketplace, the integration of e-commerce models of business will become more prevalent. It is imperative that colleges and universities provide themselves with the best possible chance for success, which may mean integrating different ways of thinking about how to re-purpose distance education offerings into various markets. Now more than ever, students are becoming consumers, and distance education is a competitive marketplace. The appropriate integration of e-commerce into higher education can benefit all involved if done well.

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Sally M. Johnstone

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U.S. Distance Learning: A "Cottage Industry"

All the available data seems to indicate that online courses and programs are proliferating steadily. Yet they are, by and large, still quite faculty-centered and adhere to the traditional "one size fits all" model of pedagogy. A single faculty member designs the course, creates the materials (with some help from specialized software packages), manages the class, and assesses the students. The courses are taught in the same old semester format, based on the amount of time a student sits in his or her class. The means of measuring the length of a course was designed to manage students coming to a physical space for their learning opportunities.

As Terry Hilsberg, chief executive officer of Hong Kong-based NextEd Ltd. pointed out at a recent Western Cooperative for Educational Telecommunications (WCET) conference, we are using a cottage industry approach to distance learning. Most U.S. institutions do not have an institution-wide strategic approach to distance learning. Individual faculty members are practicing their craft with online tools, but there is little change in what they offering students.

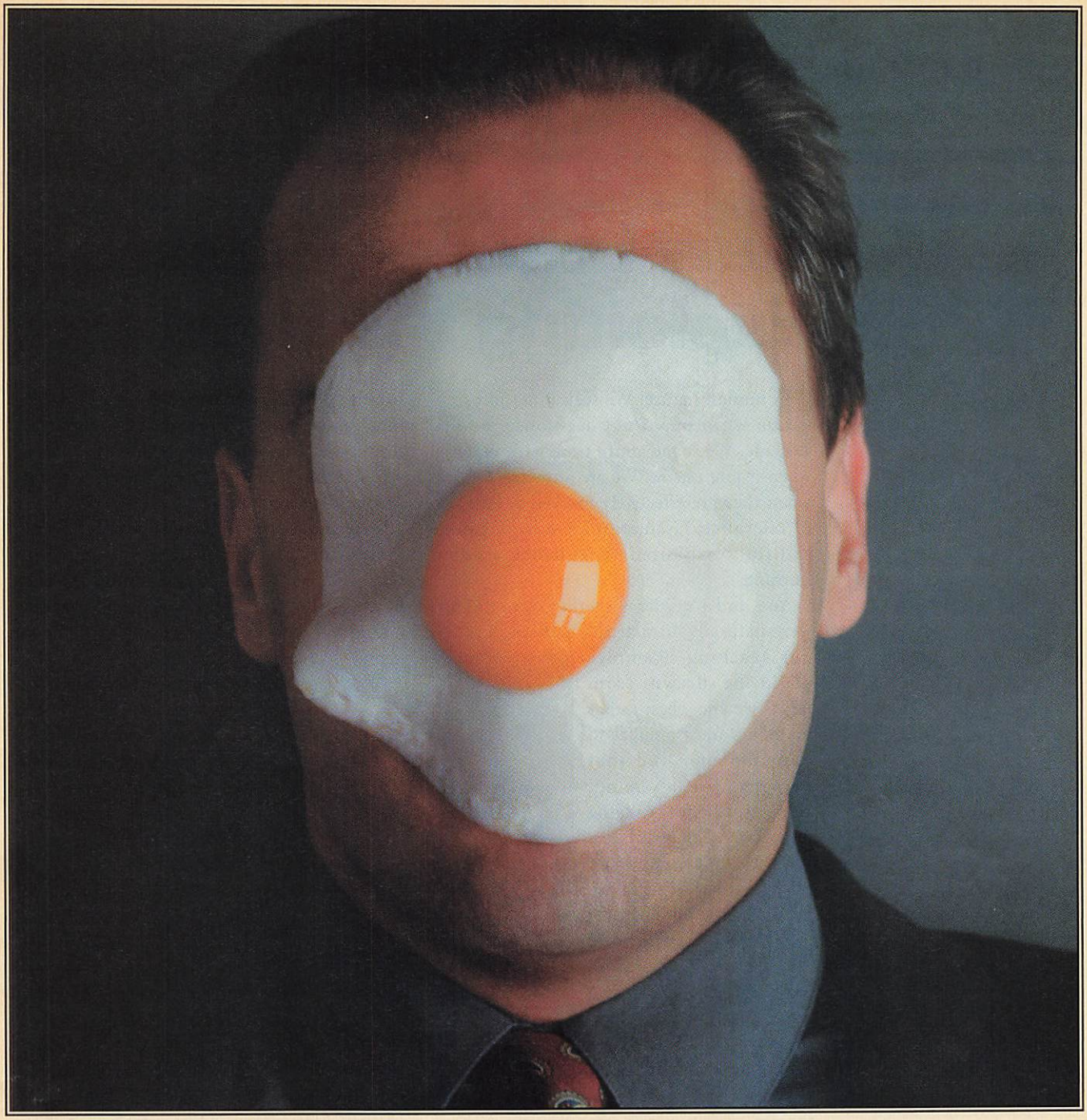
The work of Carol Twigg, executive director of the Center for Academic Transformation, and her colleagues is showing us models of what is possible when whole academic departments begin working together to use technology to help students succeed (www.center.rpi.edu/pewhome.html). These projects are all working on campuses with local students, but there is no technological barrier to moving the models into a distance learning environment.

A great example of this innovative approach is the required statistics course the Ohio State University faculty redesigned. Many students were failing it despite having seemed to master the first half or two-thirds of its content. They fared poorly only in the course's last section, but still failed the entire course and therefore had to repeat it. In the redesign, the course was broken into technologically supported modules through which the student could progress. Some students might finish all of them in less than a semester, others might take one and half semesters, but no one had to repeat material they had already mastered.

Another problem with our cottage industry approach is the lack of economies of scale. Since Ohio State's statistics faculty members have gone through the effort of redesigning a fairly standard course of study, why can't other universities and colleges take advantage of that work? With technologically mediated course modules, there is no fundamental reason why dozens of other institutions could not use them to assist their own students either on- or off-campus. The biggest barrier is probably our cottage industry values that drive institutional cultures.

As campus leaders look strategically at how they can use the online environment, perhaps they will recognize the financial realities and the increased potential for students in shifting away from the craft-industry approach. Perhaps they will be able to put the needs of individual students in a central position for new learning environment designs. Maybe it will even be possible to eliminate the specific seat-time requirements for federal financial aid eligibility so that distance learners will have all the support face-to-face learners now have. Of course if students on campuses are shifting to using modules that are material dependent and not based on time-in-class and seat-time, the rules may evaporate of their own accord. Who knows?

Illustrated by T. J. Florian



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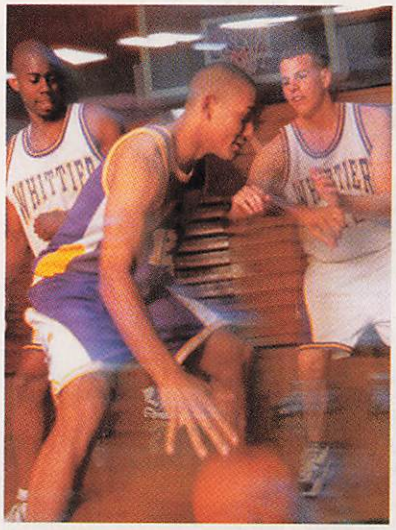
David Brown is vice president and dean of the International Center for Computer Enhanced Learning. He has served as president of Transylvania University, chancellor of the University of North Carolina at Asheville, and chair of several national groups, including the AAHE and the Higher Education Colloquium. As provost of Wake Forest University, he founded the Annual Conference of Ubiquitous Computing Colleges and Universities, and founded the Journal of Computer Enhanced Learning. brown@wfu.edu

New Learning Tools: Exploiting the Hype

It's human nature! We seek more information when important decisions are to be made. We spend more time with material when it interests us. We are attracted to ideas when they are effectively marketed. This trio of relevance, fascination, and hype can be skillfully exploited to enhance student learning.

You and I might wish that our students were naturally attracted to our subject, that our teaching examples could be drawn from topics we know best rather than ones most familiar to our students. And that MTV and ESPN were not competitive with studying our lessons. But, much like the merchant surrounded by gigantic neon signs, we must adapt to our environment or be comfortable serving only the most dedicated and focused.



I've just finished grading the final exams for "The Economists' View of NCAA Basketball." This was my best class ever. More than in seven previous semesters, my students displayed an in-depth understanding of the concepts taught.

Student evaluations that I collected independently at the conclusion of the course reflect that, when compared with other courses, these students believe they spent less time and learned more.

My perception is that they spent more time and learned more, the difference being that they didn't think of time spent with a favorite topic, NCAA basketball, as study time for their economics course.

Economic concepts were snuck in while students were debating issues that interested them, such as players' decisions to leave early for the NBA, expenditure equity between men's and women's programs, the opportunity costs of shooting three point baskets for a strong rebounding team vs. a team without rebounding strength, etc.

Face-to-face class time was spent discussing these issues. Instructor lectures were brief. Often the discussions started toward the end of class and continued online, or started online and continued in class.

It may have been the students who happened to enroll in the class, but I think that both topic and technique were a substantial element in the success. When framing strategy for the discussions, four guidelines were used:

1. The discussion question was pointed and specific. The answer was a matter of informed opinion. Several answers could be correct.

2. Bystanders were not allowed. All students were required to enter the discussion (often within a small group). The quality of their contributions to the discussion, as judged by fellow students and the instructor, influenced their ultimate grade in the course.

3. The discussion of the issue was time-limited. For online contributions, for example, no discussion was extended beyond 48 hours.

4. Whenever possible, the discussion was either begun or concluded face-to-face. This helps underscore the idea that online communication is the servant of colloquy, not vice versa.

Somehow, we avoided those shouting matches that I hate watching on *Crossfire*. Teaching through controversy and debate was refreshing and fun, for both student and professor.

Photographed by Stewart Cohen

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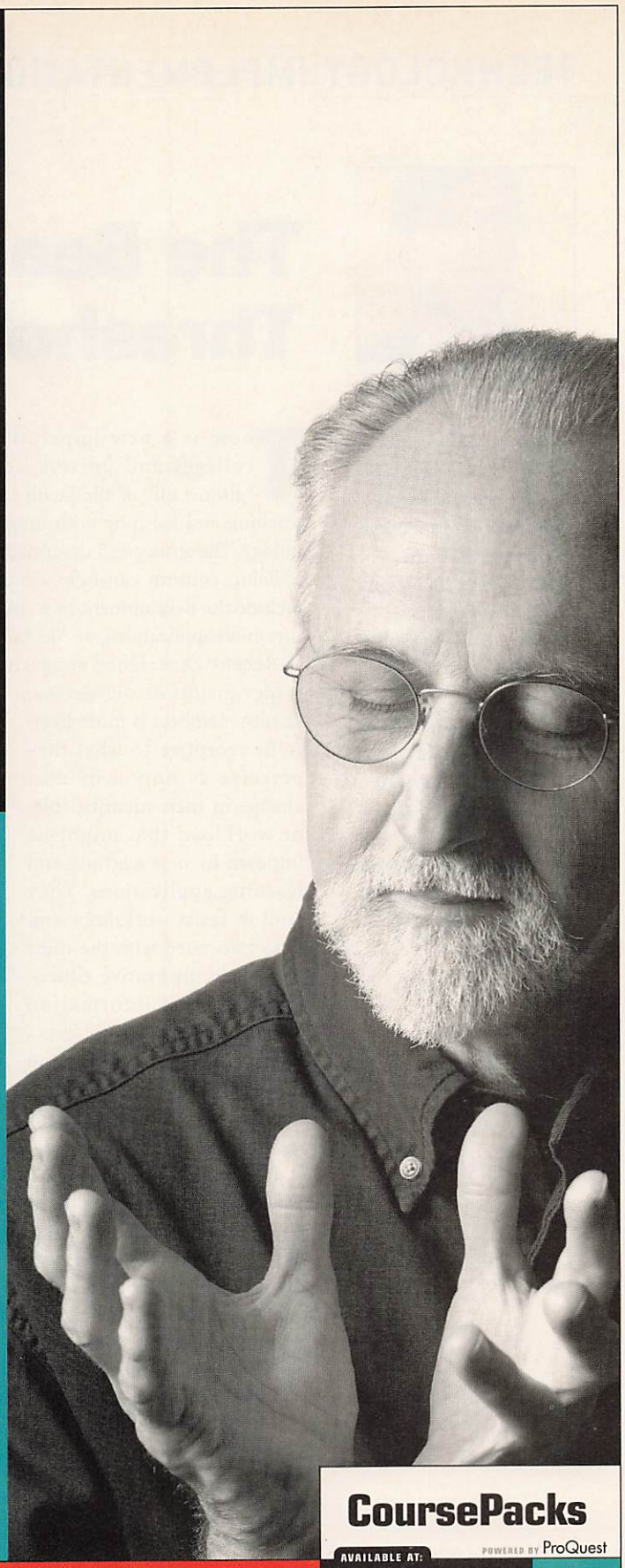

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Steven W. Gilbert

Steven W. Gilbert joined the American Association for Higher Education as director of technology projects in July 1993. He founded the TLT Group as the Teaching, Learning, and Technology Affiliate of AAHE in January 1998. He was previously vice president of EDUCOM, where he created and led the Educational Uses of Information Technology program and the EDUCOM Software Initiative. He also moderates the Internet Listserv AAHESGIT.
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The Beauty of Low Threshold Applications

There is a new imperative for many colleges and universities to engage "almost all" of the faculty in improving teaching and learning with information technology. The strategies I described in a previous *Syllabus* column can help, especially if they include the development of a collection of low threshold applications, or "LTAs."

Recent experience suggests that a new, larger group of mainstream faculty members is more likely to be receptive to what they perceive as only a modest change in their identity, role, or workload that might be imposed by new teaching and learning applications. They tend to resist workshops and risks associated with the most obviously innovative educational uses of information technology. They also resent—rightfully—the implication that their work of past years or decades has been inadequate or incompetent.

Many of them have much to offer and welcome opportunities to contribute to the overall change process—within reasonable limits. They are busy and do not have a lot of extra time. Consequently, a new approach is needed to meet the new needs of this different, much larger faculty subgroup. And LTAs may be part of the solution.

Here are some characteristics of LTAs:

• They have a low entry cost. That means low hardware, software, technological infrastructure entry cost and no major structural changes. LTAs are characterized by technology that is already almost ubiquitous, essential for the academic discipline, and/or inexpensive. In other words, the technology components of LTAs have low incremental costs for the institution and for individual faculty members and students who will be using them. Low incremental cost can result from the institution or individual already having invested in the necessary resources ("sunk costs"), or from the technology components having low, fully loaded, fully amortized costs.

• LTAs are easy to learn, and based on using technology applications and teaching/learning techniques that are already known by or easy to learn for both faculty and students.

• LTAs are not intimidating. Faculty and students do not perceive LTAs as requiring major re-adjustments in their roles or in their lives. The LTAs are based on technology applications and teaching/learning techniques that do not intrude into the classroom or disrupt the course. LTAs require activities that already feel familiar within the usual course work.

• Teachers and learners believe that they can rely on the technology underlying a particular LTA. LTAs usually work as expected, especially when used during classes that cannot easily be extended or re-scheduled. But reliability depends as much on the quality and robustness of the technology infrastructure of the particular college or university as on the LTA technology itself.

LTAs should be able to reflect observable positive consequences; at least anecdotal testimony and the judgment of colleagues should confirm desirable results from similar efforts. At best, formal studies should show that positive outcomes are associated with the activity. Stories and evidence suggest that after a few years, the LTA is likely to precipitate or at least contribute to desirable changes in how teachers and learners think and act.

In developing collections of LTAs, we can

usefully organize them into three categories based on the source of the technology applications:

1. Almost ubiquitous technology. These LTAs take advantage of the concept of "sunk costs" by using technology applications that are already almost ubiquitously accessible within the institution.

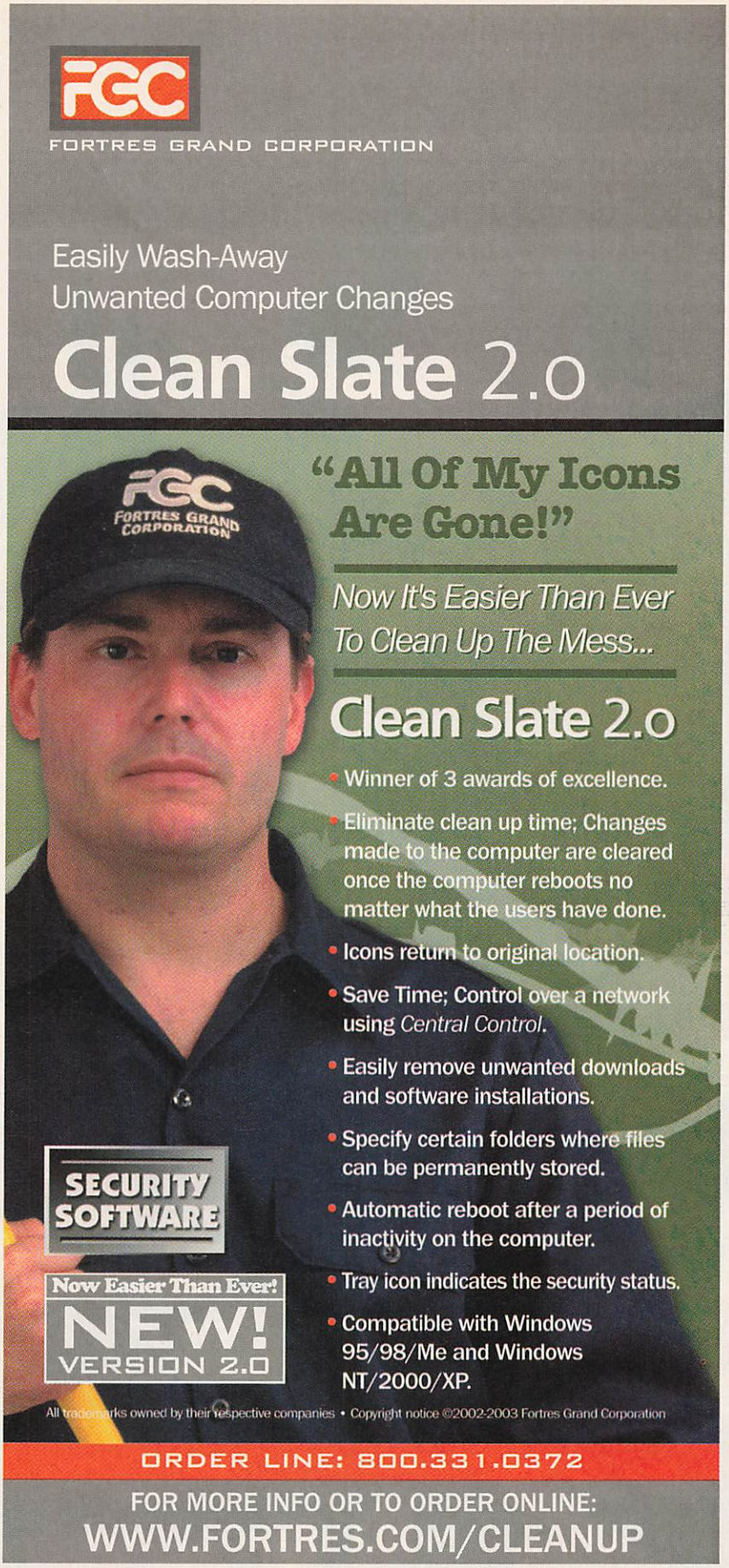
2. Commercial products. These LTAs use commercial technology applications that require little incremental expenditure by the institution and little or no additional training or support for faculty and students.

3. Open source/open course resources. These LTAs use items from Open Source-style collections of instructional and professional development resources. These collections should require little or no payment from individual faculty members and should encourage users to contribute to the development of the resources. See www.tltgroup.org/OpenSource/OSPDGuidelines.htm.

No individual faculty member can keep up with the pace of new instructional and professional development techniques. Nor can any one LTA individually help "almost all of the faculty." While each faculty member might be able to use an LTA to help some other faculty members, collaborations among faculty leaders, faculty development professionals, librarians, and technology professionals are likely to reach further and more effectively.

By collaborating, these different professionals have a better chance of getting on top of the chaos, of identifying more effective and useful resources, and of developing more attractive and feasible programs for the mainstream faculty members. It may be just the right time to apply some of the "Open Course" principles, practices, and tools to the improvement of teaching and learning.

Watch www.tltgroup.org/LTAs/tltccnLTApage.htm for more information about how you can participate in these collaborative efforts—both online and at selected events.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How will your institution provide faculty support services?

Soaring enrollments in distance education courses and student expectations for technology-enhanced instruction are causing colleges and universities to consider new approaches to faculty development and technology support. Here, two such institutions are profiled.

Illustrated by Kevin Ghiglione

A Technology Support Model for Challenging Times

By Andrew Lawlor and Dennis J. Bradley
Edinboro University of Pennsylvania

Technology support requirements in higher education are escalating, but the resources available to meet these needs are not. How does a campus balance these two realities?

In many ways, Edinboro University of Pennsylvania has typical issues and challenges regarding support: more requests for service than people and time available to address them, less technology than demanded, and increasing sophistication and expectations of the client community. In searching for answers, it looked as if no one good idea or best practice would address these challenges. Many approaches would have to be adapted to Edinboro's environment and culture.

Environmental Factors

With a new president in 1996, a new campus priority emerged—enhancing technology campuswide. By many measures, Edinboro University was considered "behind" in providing a comprehensive computing environment for students, faculty, and staff. With this new priority came the resources and an expectation to improve conditions at the university. As a result, the support structures for information systems, desktop and lab computing, networking, telephones, and distance education were organized under one umbrella dubbed Technology and Communications, which was responsible to the president through an associate vice president. As a new, and integrated, support structure, it represented an opportunity to change the

orientation of both the staff and the perceptions of the user community. Before that time, although there were many good individual efforts by staff, the organization overall had a negative reputation. Thus, the challenge was to develop a support environment that responded to the needs of the campus (by both deploying new technology and supporting it), improve the perception of the user community, and restore the morale of the technology support staff members.

Assessing the environment, particularly its culture, leadership, and values, was a key component for developing a successful strategy. With the new leadership came new a new paradigm for change—one that articulated a vision embraced by the campus community. It was within this new environment that our model was to function.

A New Support Structure

We began by organizing into three teams: Enterprise Systems (centralized information systems), Networks and Telecommunications, and Desktop Systems and Learning Technology (DSLT). To provide some focus and shared understanding, a wide-ranging task force was established, with both internal and external members, to develop a mission statement for Technology and Communications. The mission statement continually orients our work toward our "reason for being" and overlays our planning and implementation of initiatives.

With the bulk of the support calls coming into the staff members from DSLT, and no organizational tool to address these support needs systematically, a help desk solution was sought by that team. A student employee phone bank was put in place to field the initial calls, and PHD help desk software was deployed. As a Web-based tool, we were able to add extensions to allow campus users to look up the status of their calls. Eventually, PHD was replaced with an application created by a team member that allows individuals to submit their help desk calls via the Web. The use of the help desk was expanded by its adoption by the Networks and Telecommunications staff.

The help desk's greatest value is that of a tool to manage the flow of work into the operation. Before its use, campus employees called anyone and everyone in the office to try to find someone to help them. If they did not receive a satisfactory answer, they often called back and tried someone else. By directing the campus to contact the help desk, and assuring them that their problem will be addressed, staff members can now spend more time solving problems—and finding ways to prevent them—with less redundancy and overlap. Since boundaries have been established for the campus community, its members better know what to expect and how to access services. It is no longer a matter of who you know, but a standard protocol that everyone understands. A department liaison program is now being piloted to offer yet another dimension to technology support.

Communication and Customer Service

Similarly, the range of services offered by Technology and Communications were not well communicated. A set of Service Guides is being developed to address this deficiency. Also known as Terms of Service, this approach provides a documented explanation of what the service is and how it is offered. Again, by defining the boundaries of service, user expectations are not out of line with the resources available to support them.

Along the lines of communication, committees for each team were initially set up with a broad range of employees installed as members. The difficulty, we found, was that the committee participation varied widely and there was rarely an opportune time to hold the meetings. This approach was abandoned in favor of holding open meetings, once per semester. Any member of the campus community is welcome to attend and hear an update on the progress of initiatives as well as to ask questions or make comments. Student input is sought and received at periodic presentations by the Student Government Association. A Teaching and Learning with Technology Roundtable was established to bring together faculty who are interested in sharing ideas about technology integration, and provide them with a forum to help Technology and Communications serve them better.

A customer service emphasis has been placed on all staff interactions with our client base. As a "student-centered environment," it is stressed that our students should be treated like customers. Similarly, staff who access our services to assist students are indirect customers. A variety of staff were sent to customer service training, and they in turn held customer service sessions at our monthly staff meetings. To reinforce this emphasis, a two-dimensional survey has been conducted to assess the satisfaction with a variety of services we offer, including interactions with our employees.

Meeting the Community's Goals

The model used by Edinboro University to transform its technology support structure is not based on any one mode of support. Rather, the university seeks to find ways to leverage the resources it has to meet its goals within the culture, leadership, and values of the institution. It is the responsibility of the chief information technology officer to continually communicate this to both the staff and the campus community. It is understood that the resources available for technology support are limited, but are being put to the most productive use possible. By connecting students, faculty, and staff to one another and to the resources and support they need to function effectively, people better understand limitations if and when they encounter them. The support organization is not trying to be "all things to all people"—a recipe for failure. Rather, it is positioned as a responsive, involved component of the university that is striving to provide access to the technology and tools that help members of the campus community reach their goals.

Andrew C. Lawlor, *Ph.D. (**lawlor@edinboro.edu**) is the associate vice president for Technology and Communications and* ***Dennis J. Bradley*** *(**bradley@edinboro.edu**) is the director of Desktop Systems and Learning Technology, both of Edinboro University of Pennsylvania.*

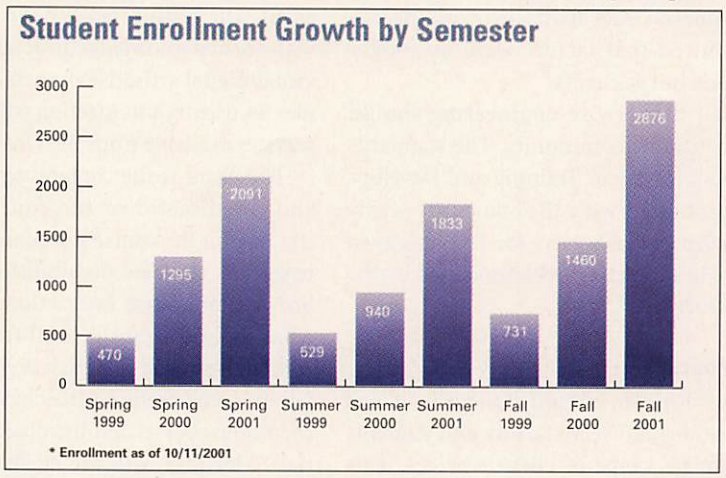
Faculty on the Move: Rethinking Faculty Support Services

By Mark L. Fink
The University of Toledo

The demands on faculty who use technology in teaching, course administration, and communications continue to increase. Here, Mark Fink outlines The University of Toledo's approach to faculty support.

The administrative tasks involved in ensuring that faculty can develop for-credit, undergraduate, and graduate courses to instruct students at a distance can often prove daunting. Faculty must re-examine every method of teaching their bricks-and-mortar course and learn enough technology to effectively engage students in the learning process. Not only must faculty have the technology necessary to communicate with students, they must assist students who may lack the technological skills to perform various tasks—all within the context of a field where technological tools often outpace the faculty's time to learn them.

This experience, felt by many higher education institutions, prompted a reorganization of faculty development at the University of Toledo's Division of Distance Learning. The division, an outreach arm of the university, is charged with enabling the university's eight colleges to develop courses through various distance education delivery media.



Phenomenal Growth

Growth in the division from its inception in 1995 to the present is exceptional. Comparing enrollment from a term in one academic year to the same term the following year reveals that twice as many students are enrolled (see chart, below).

The growth of faculty teaching courses via distance education also increased significantly. In the past year alone, more than 20 faculty members have ventured into the distance education arena. Making any reorganization even more imperative is the impact of faculty teaching more courses. Typically, faculty taught one or two courses per term. Today, faculty are teaching upwards of 21 courses per academic year. The exponential nature of doubling enrollments, new faculty, and faculty teaching more courses, moved the Instructional Design team evaluate its faculty development operations.

This unparalleled growth of enrollment for courses delivered via distance education also prompted a restructuring of the services available to faculty. This growth expanded the number of faculty teaching students at a distance, a vast increase in courses offered, and new degree, degree completion, and specialized programs. The distance education growth experienced by the university prompted the senior instructional systems designer to evaluate practices and operations. During the evaluation process, it became apparent that a unique faculty development model would have to allow faculty to focus on instruction by providing a full range of services to faculty, including expanding student support services.

Back in the early stages of the division, it was achievable for faculty to develop courses by being trained in all aspects of course development. Technology skills were shared with faculty that would enable them to "do it all." Using mid-level software applications, course management skills (e.g., loading students into a course), and increasing faculty knowledge in instructional systems design (ISD), faculty were compelled to manage a diverse range of tasks, and were therefore limited in the time available for instructing other courses.

Needs Assessment

The evaluative process made it clear that faculty could not continue to "do it all." While a handful of faculty enjoyed continuously learning new technological skills and Web devices, the majority did not have the time or motivation to be all things to all courses. Therefore, it was determined by the needs assessment that a reorganization of the process was necessary for continued success. The needs assessment found that faculty desired to spend their already compressed time focusing on interacting with students, rather than spending hours designing hypermedia for distance education delivery.

Additionally, the assessment found that faculty with more time to focus on content could provide greater creativity in reaching students through superior interaction, improved sequencing of content, enhanced assessment instruments, and innovative group projects that stimulate the students' cognitive gain.

In searching for an operational model that would work in the context of the division of distance learning, it became evident that no such model existed: The division is self-supporting, the courses are taught by faculty approved by their respective college and department, and the technologies utilized vary by course.

The growth and the analysis proved two things. First, the self-supporting nature of the division required an implementation that merged corporate instructional design operations with those of high education. Not only did instructional design services necessitate following a corporate model (using ROI, CBA, etc.); it had to maintain the rigorous standards of instructional design practices for the academy. The instructional design work completed at the university had to increase in efficiency and effectiveness. The task of transitioning a team of instructional designers, visual artists, network specialists, and instructors required that faculty were no longer perceived only as colleagues, but as clients.

The assessment proved that any re-engineering should follow standards of the corporate community. The standards as defined by the American Society of Training and Development (ASTD) were incorporated with the standards set by education through the International Society for Technology in Education (ISTE) and the best practices recommended by the American Federation of Teachers.

Client Services Approach

After evaluating the needs assessment and standards, it was determined that the division could serve faculty and students best by providing a complete range of client services. This includes a laundry list of services to enable faculty—and students—to have the greatest opportunity to engage in the process of learning within the virtual walls of the academy. In assisting faculty in course development, the ISD team can create a complete course for the faculty member, including an ISD design, Web-based content pages, photography, graphical imaging, original artwork, animation, video, audio, and other related services for the course.

Given such a dramatic shift in distance learning operations, it was necessary that the structure reflect the philosophical shift to faculty-as-client. The Client Services Model (CSM) provides a unique perspective at developing courses to be taught at a distance by consulting with clients to ensure that the needs of the students, the faculty, and the university are met.

Several considerations were made in developing this model. As the division is responsible for providing distance education opportunities for all the colleges, dividing Instructional Design work by college appeared logical at first glance. After investigating this possibility, it was determined that there would not be a transfer of knowledge across disciplines. For example, if an instructional designer working for a client in the physical sciences designed a problem-based learning (PBL) instrument, the instrument—or a component of that instrument—might prove beneficial in a social science. Although this works well in higher education, cross-disciplinary design still had to be managed like a corporate ISD Department. Because of faculty constraints on time, it was necessary that faculty know whom to contact to resolve a certain issue. Although that instructional designer may have the answer for the client, the client is responsible for seeing that the person responsible for the issue within the division is informed.

Faculty Process

Although it appears that the CSM requires a larger staff, the staffing is comparatively less than many institutions with fewer courses. When a faculty member is confirmed as teaching a distance learning course, the director of distance learning notifies the IT specialist. The senior instructional designer assigns an instructional systems design team for the client. The team consists of an instructional systems designer with formal knowledge in learning theories partnered with a visual/digital artist. Next, the instructional design team schedules an orientation meeting with the new client explaining the services available from the Division of Distance Learning.

The client is the content expert, the mentor, the instructor, and the director of the course. The orientation includes training on the course portal used and "homework." The client considers the new possibilities that the delivery media will provide for course interaction and presentation, or discovers what will not transfer well from the traditional classroom. Although printed materials are given to all clients at this orientation, each meeting varies based on the characteristics of the client, the course, and the objectives of the instructional materials. Meetings with the client continue on a regular basis to provide continuous quality improvements.

Client Tools

As the faculty transformed into full-service clients, an opportunity arose to provide a new set of tools relating to their focus of instruction. Several tools were created and still undergo continuous improvements.

Clients who teach students at a distance were often isolated

within their department and previously were unable to share their adventure with colleagues in other disciplines. Therefore, a Web-based faculty forum was created with a chat room, bulletin board, a showcase, and a series of content areas providing the latest research in teaching via distance education. This forum became particularly useful for faculty who teach courses from locations in China, Kenya, and Hawaii.

Unloading clients from the burden of acquiring high tech skills was imperative to the success of the model. While faculty are still free to "do it all" if they choose, they have overwhelmingly appreciated the ISD team's services. Some of the services eliminated entire tasks previously relegated to the faculty, while other services provided more efficient methods of completing the same tasks. Previously, faculty had to load their own administrative data into each course they instructed. Today, the division loads students for the client. Previously, each question of an assessment instrument had to be entered into a question databank, whereas today faculty can either use File Transfer Protocol to transfer an entire quiz to the portal or send their quiz (in Microsoft Corp. Word, or via e-mail or fax) to their ISD team for entry. Previously, faculty had to know how to build all content within the portal of their course. Today, clients meet with their ISD team, explain what they need, and review high tech courses created through a unique partnership between the client and ISD team.

Student Support

In order for clients to engage students in academic discourse, it was necessary for student support services to be the responsibility of the division. While a full range of student services exists within the division, the instructional design department of the division provides technical support. Support for students and faculty is provided through a Web-based "help" and support area, e-mail, and a toll-free telephone number. In addition, the ISD team is developing a knowledge database for the Web, a support chat room, a Web cam support area, and a complete course for students providing study strategies for academic success in any course taken at a distance.

While it may appear that student support has nothing to do with faculty development, the reality is that students are central to success. A student who is under-prepared to engage in a distance learning course impacts the quality of the instruction that the faculty is able to provide to others in the virtual classroom. By providing technical support and prerequisite skills to students, faculty spend less time teaching non-content skills, and more time interacting with students.

Mark L. Fink is the senior instructional designer for the Division of Distance Learning at The University of Toledo (Ohio).
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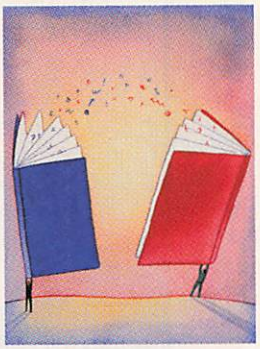
Anatomy students at the University of Utah consult multi-dimensional electronic textbooks; at Texas A&M, mulling calculus problems on the Net; two Philadelphia colleges share educational vision and technology support; rating an online study guide at the University of Mississippi; Campus Pipeline, one year later; and laying the groundwork for electronic commerce.

THE BODY ELECTRONIC:

eBook Developed for Anatomy Study

Gross anatomy students at the University of Utah medical school have a leg up on those taking similar courses around the country, thanks to one professor's use of new content delivery technology that is making it easier for students to review important lecture materials outside the classroom.

At Utah, the Adobe System's Inc. Acrobat eBook Reader is solving a teaching and learning problem. Kurt Albertine, professor of pediatrics, medicine, neurobiology, and anatomy, says, "We show a lot of important, original images—more than 300 radiographs, photographs, and drawings—on the screen in the front of the room during lecture. But all our students have is a set of black and white notes with limited illustrations. They don't have copies of the images we put up on the screen. Students can annotate the printed notes, but they have no easy way to copy the presentation."



Taking advantage of the available eBook Reader software, Albertine, Trish Goede, director of Utah's Electronic Medical Education Resource Group, and her staff are taking all of that original content and building a course eBook. They're adding interactivity as well, including captions for figures that will appear as mouse rollovers. Labels can also be turned off to facilitate self-assessment.

The eBook Reader offers users the opportunity to view and interact with visually accurate representations of graphics-intensive content. Much like a PDF file, an eBook file presents a vivid replica of a document. However, eBook technology goes beyond that. PDFs provide a fixed image, but eBook technology allows content providers to build in audio, video, and interactive features. When students open a document using eBook Reader, they have access to the formatted pages and any bells and whistles built in. Students can highlight, annotate text, search text, access the Web, and open an interactive dictionary. Content providers can build in audio cues such as voice pronunciations of difficult terms. The documents appear in all their colorful, rich font glory on two-page spreads.

The eBook Reader is a relatively new technology. Currently, about a dozen academic institutions, including Utah, are participating in a test run of the technology. At the same time, some publishers are using Adobe's Content Server to secure and distribute PDF-based eBooks. The Adobe solution lets content providers encrypt the files to sell as eBooks. The encryption protects their digital rights and facilitates safe distribution of the material.

Albertine, who in addition to practicing and teaching medicine is an experienced academic author, is quick to point out the pedagogical advantages of the eBook Reader technology. "We can augment the text with descriptions, references, and other features. This is a quantum leap forward in information delivery. Suddenly we can create a tool that takes students at will from the big picture to finer details."

Says Goede, "This is an easy tool for instructors to use. If they can make a PDF file, they can deliver eBook content to their students." Once the base content is available as an eBook, instructors can work with information technology staff to add levels of interactivity, audio clips, and video features.

The anatomy material went live in December. Goede and Albertine are in the midst of a student survey to gather reaction to the material. So far, reaction has been positive. Students have commented on the convenience of having access to the lecture slides outside of class. As one student put it, it has the potential to be a "one-stop shop." Notes the student, if it includes useful features and functionality, "the eBook presentations could actually be all a student would have to study to do well." They plan to have the entire set of course materials in eBook format by the fall semester of 2002.

For more information, contact ***Trish Goede*** *at* ***pgoede@hsc.utah.edu.***

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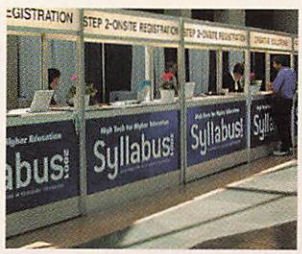

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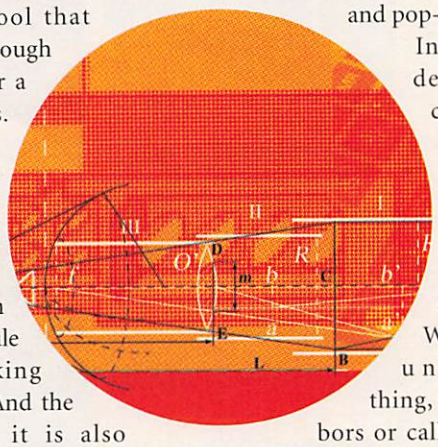
Figuring Web Calculus via Special Browser

At Texas A&M University, professors have developed a special curriculum designed to make high-quality calculus courses available to those who do not have access to the traditional classroom. The courses, first and second semester WebCalc 1 and WebCalc 2, were developed by Don Allen, Mike Stecher, and Philip Yasskin at Texas A&M beginning in the fall of 1997. They cover material required in the two-semester engineering calculus sequence and are also available to high schools as AB and BC advanced placement courses.

The course is recommended for self-motivated students, the type who might want to take a calculus course at a small high school that does not have enough students to offer a traditional class. It is also excellent for mature students wanting to take a college calculus course on their own schedule while working during the day. And the professors say it is also perfect as a review course for a high school math teacher who is suddenly told she will be teaching AP calculus next fall and has not looked at calculus for the past eight years.



An introduction and description of the course is available on the Web at www.math.tamu.edu/~webcalc. However, the course material itself is not accessible using either Internet Explorer or Netscape. That's because the quality of mathematical display via those browsers is not up to the standards of the course developers. Rather, students must obtain a specialized browser called Scientific Notebook. The browser, which can also be used as a sophisticated graphing calculator, is available for about $99 from MacKichan Inc. or free for 30 days at www.mackichan.com. It comes with Maple and MuPad computing engines.

From within Scientific Notebook, the full text of the courses can be obtained via the Web by clicking on File + Open Location and going to www.math.tamu.edu/~webcalc/1/mindex.tex for WebCalc 1 or www.academicsolutions.com/webcalc2/mindex.tex for WebCalc 2. This brings up the main table of contents for each course. There are hyperlinks to the chapter tables of contents and the pages of the course. The text includes a derivation of the basic concepts with pop-up notes for more detail, proofs, and historical references. In addition, there are many examples with full solutions, exercises, and pop-up quizzes.

In the studio mode of delivery, the students come to a computer lab three days a week for 50 minutes. There, they read the course text and practice with exercises and pop quizzes. When they don't understand something, they ask their neighbors or call the instructor or teaching assistant over for direct one-on-one help. Then, for two days a week for 50 minutes, they meet with the instructor who answers questions, does a few more examples, gives a quiz on a chapter, and introduces the material from the next chapter. The students also take three midterm exams and a final.

In the distance mode of delivery, a college student covers the material at his or her own pace but is expected to cover two or three small chapters a week. After each chapter, the student takes an unproctored quiz. The quiz is posted on the Web, and the student e-mails or faxes the quiz back to the instructor who e-mails or faxes the results back to the student. In addition, the student takes three proctored midterm exams and a proctored final. The proctored exams are taken at a location that is mutually acceptable to the student and the instructor. If the student needs help, the instructor sets up a Web-based tutoring system with a chat room and an online mathematics whiteboard.

High school access varies, as every high school has to work out its own procedures. However, here is a possible schedule: The high school students would meet in a computer lab five days a week for 50 minutes to read the text and practice with exercises and pop quizzes.

It would be best if the school could designate a math teacher who would be available to answer questions. If that is not possible, the WebCalc authors will set up a Web-based tutoring service similar to that for distance-mode students.

The students are expected to cover two or three chapters a week. After each chapter, they take a quiz, which is proctored by someone at the high school. In addition, the students take three (or six) proctored midterm exams and one (or two) proctored finals. If the school can provide someone who can grade the quizzes, midterms, and finals, that is great.

Otherwise, the WebCalc authors will set up a grading service where the school faxes the tests to the graders who fax the results back to the school. For home schooled students, the parents proctor the exams and the WebCalc authors provide the Web-based tutoring service and grading service.

At Texas A&M, grades have been about equal to those from the traditional sections, sometimes higher and sometimes lower. Blinn College reports that the completion rate for WebCalc students is the same as for traditional students.

For more information, contact ***Philip Yasskin,*** *Ph.D., Texas A&M University, (409) 845-3734 or* ***yasskin@math.tamu.edu.***

A Cross-Town Partnership

Taking advantage of geographic proximity and economies of scale, two Philadelphia higher education institutions have launched a special partnership to share their technology support and educational vision.

Cabrini College, a small, Roman Catholic, liberal arts college, has partnered with Drexel University, a Philadelphia-based technological cooperative university. Drexel will share computing staff, technology support and assist Cabrini's move to becoming a completely wireless campus.

When administrators at Cabrini began planning its technology future, they considered outsourcing services to an organization. However, working with Drexel was more appealing. For one thing, Drexel has a history of technology "firsts," starting with its 1983 mandate that all students have access to a microcomputer. Also famous for being the first major university to go completely wireless, Drexel's technology leadership and proximity to suburban Philadelphia's Cabrini made it a desirable partner, says Antoinette Iadarola, president of Cabrini College.

Iadarola felt that a fellow higher education institution would better understand Cabrini's mission. Not only that, but working with Drexel was cost-effective, considerably less expensive than a vendor would have been. So, she approached Drexel's president, Constantine Papadakis, about the partnership, and the deal was struck.

Cabrini College has grown rapidly in the past several years, increasing its enrollment by 50 percent and expanding the academic heft of its student body at the same time. Iadarola saw a technology upgrade as a logical next move. "We are very strong in some technology areas like graphic design, communication arts, and Internet computing," she notes. "We wanted to support those students and make sure we offered them and all of our students the best available technology." Besides, she believes it is absolutely critical that small institutions stay ahead of the technology curve if they are going to survive.

Through a hybrid staffing arrangement, both Cabrini and Drexel staff members will support Cabrini's information, technology, and resources areas. This mixed group—which includes two end-user support specialists, one audiovisual end-user specialist, a first-line help desk assistant, and a network engineer—will be assigned permanently to Cabrini College. According to Iadarola, putting staff from the two campuses on the same team will not only cut costs, but create a better support team.

Officially launched in March 2001, the partnership has already had an impact on campus life. Cabrini has switched to a completely wireless environment. Incoming students will bring their own laptops, equipped with the tools to interact wirelessly from anywhere on campus. Drexel's instructional design staff is already running faculty development workshops, helping faculty create Web-based teaching materials and build online courses.

Sometime next year, Cabrini's Drexel connection will result in access to the Internet2 network. Cabrini will perform network analysis and upgrading and increase its distance learning offerings, putting some certificate programs completely online and moving toward offering some four-year programs online.

For Drexel, the partnership has provided economies of scale, presenting an opportunity to maximize its resources. In fact, the arrangement has been so successful that university officials are talking with their counterparts at other small Philadelphia-area colleges about partnering in similar ways.

For more information, contact ***Nancy Gainer*** *at Cabrini College, (610) 902-8254.*

Making the Grade: Pilot Program Test-Drives GradeSummit

Will students put more time into studying for a course if it means they're more likely to get a better grade? Does a Web-based format and immediate feedback encourage students to use a study tool more than they would use a printed workbook? What is the benefit to instructors of online study tools? These products seem handy, but do they really work?

These are fundamental questions one could ask of any online study guide, workbook, or quiz package. Until they are tested, no one knows how effective such tools are. Last fall, instructors from several universities piloted a new product called GradeSummit to determine its usefulness as a study tool for courses in history, life sciences, chemistry, economics, and psychology.

One of the pilots was conducted at the University of Mississippi, where professor Michael Namorato tried GradeSummit in his American history survey, which enrolls 180 students. Says Namorato, "I was surprised how many students participated in the pilot. I offered extra credit for students who completed a series of assignments, which included at least 40 minutes on the 15 topics and passing an exam. Over half of the course completed the extra credit work."

Students also completed an evaluation of the product, calling it useful practice, helpful review, and good use of technology. Most students found the quizzes helpful study aids and appreciated the benefits of repetition from the lectures and textbook. Notes Namorato, "The biggest asset of the product is repetition. History is full of so many details that getting the material again and again really helps."

There were a few bugs, notably answers that didn't seem to fit the question and a couple of technical glitches. Still, students were able to navigate through the online material easily. Based on their feedback, Namorato is assigning GradeSummit to his American history survey course in the spring.

By using the online tool, instructors could save time otherwise spent conducting and grading exams.

Although Namorato used the product as a study and diagnostic tool, GradeSummit can be used in a variety of ways. The product is primarily a diagnostic tool and includes thousands of questions written and peer-reviewed by professors in those fields. Students get immediate feedback on the quizzes. Instructors can also use the results of student work to tailor upcoming lectures, conduct student assessments, or even test students. By using the online tool, instructors could presumably save time they would otherwise spend on exams.

The online content is generic but parallels the information found in major texts for the courses covered. Because GradeSummit is a product of a collaboration between the GradeSummit company and McGraw-Hill Publishing Co., it is no surprise that the books GradeSummit links to are McGraw-Hill publications. However, both companies insist that the product is usable with any core textbook. McGraw-Hill offers the product as a bundled item with one of its texts or as a standalone item. Within a year, GradeSummit plans to release additional products for courses in accounting as well as geology, sociology, political science, business, and upper-division chemistry and economics.

For more information on the GradeSummit pilot program, contact ***Mike Namorato*** *at* ***hsmvn@olemiss.edu.***

North Shore Community College: Blueprint for Technology Implementation

When North Shore Community College (NSCC), a public college in Massachusetts with more than 95 degree programs, wanted to integrate its campus business on the Internet, it decided to use Campus Pipeline Inc.'s Web Platform solution. In doing so, it envisioned a single sign-on platform to connect its five campus locations, streamline back-office work, develop a self-service system for student services, and enhance interaction among campus users.

The building blocks of the integration were the platform and SCT Banner's online student information system, including Web-for-Student and Web-for-Faculty. Gary Ham, the college's chief information officer, says, "It was like discovering gravity. Campus Pipeline provided a single context from which we could confidently achieve all we had set out to do and more."

NSCC has now been live with Campus Pipeline's platform for one year. Students have access to online course registration, payment features, transcripts, financial aid, course schedules, e-mail, calendars, chat and discussion board areas, and even full-time online tutoring.

Developers said the successful Campus Pipeline platform implementation was directly related to extensive planning conducted before and during the project. The NSCC Information Systems group developed specific objectives to ensure campus teams would be working toward the same goal. Ham demonstrated the features of the system to campus stakeholders. The decision to move forward was made during a meeting of faculty and management.

Inviting users to form teams to make functional decisions about portal implementation was critical for gaining consensus. Three teams were then formed as a means to split the project into logical segments.

First, an SCT Banner Web Functional Team was charged with configuring SCT's Web-for-Student and Web-for-Faculty products to reflect the college's actual practices. Team members represented all of the service areas using the Banner Student Information System.

Then, a Web Technical Team, which included Information Systems staff, was responsible for the installation, initial configuration, and maintenance of the SCT Web products, as well as Campus

Pipeline's platform. Finally, a Pipeline Advisory Team was charged with defining procedures and creating the look of the platform environment.

During the fall 2000 registration period, NSCC piloted the solution into the Web-for-Student product. The success of the pilot led to a complete commitment to the product's use for business process changes. At the same time, there were a number of issues identified that were challenges to wider use of the product, including the absence of prerequisite enforcement in the system and the lack of services for the part-time evening population.

According to Delbert Brown, director of financial aid and a member of the Web Functional Team, using the Web for registration "required that we re-examine enrollment procedures. We had to ask, 'Why are we doing things this way?' We found that in many cases we were just following procedures because we had always done them that way. Many of the procedures did not have any service value whatsoever to the student."

Before moving forward with the implementation, college officials first determined how they wanted the overall system to function. The team decided that Campus Pipeline's platform with the Banner Web-for-Student product would be used initially to provide inquiry access to schedules, transcripts, student billing status, hold information, and financial aid status.

Officials also decided they would implement the platform initially only for students taking a credit course, because that student population is more stable. Non-credit students would be added to the system but only after implementing the Web payment module.

College administrators had to decide how students would gain access to their account information, deciding ultimately that they did not want to have to distribute mailings with user name and password information. The decision was made to build a front-end account activation form.

To handle account activation errors, administrators knew that they would have to expand the number of NSCC staff who could assist students with account issues. To address the problem of providing phone support and to quickly identify any account problems, a custom Banner form was developed to assist in identifying students over the phone and to organize information they provided upon activating their Campus Pipeline account.

"We have seen a spike in the number of faculty interested in taking advantage of Web-learning tools."

—Phillip Sbaratta, NSCC

The college used Novell Inc.'s GroupWise for e-mail, shared calendars, shared distribution lists, etc. NSCC decided that the Campus Pipeline e-mail system would serve as the core e-mail system for its students and adjunct faculty. Full-time faculty and staff would continue to have GroupWise accounts and have the option to integrate their GroupWise e-mail into the Campus Pipeline mail facility through IMAP.

Because students, faculty, and staff needed to have access to services at all times, NSCC installed a gas-generated uninterruptible power supply system to provide unlimited power for all systems and communication hardware in the event of power disruptions. The college also increased help desk hours and launched a system to remotely monitor all critical systems and services to notify IS staff via e-mail and wireless phones in the event of a failure.

NSCC officials said they have seen tangible results following the technology implementation. For instance, before integrating the Web platform, students could expect to wait in registration lines the length of a football field. Since the introduction of online registration through the platform, lines have been virtually eliminated.

To date, more than 8,500 students have activated their Campus Pipeline accounts, and within 15 months, more than 90 percent of registrations were completed via the Web. Early registrations for the spring 2002 semester have increased by 29 percent from the previous year and 40 percent overall since the implementation.

The Campus Pipeline Web Platform automatically creates and updates class e-mail distribution lists for faculty members as students register online, enabling professors to easily communicate with students. In addition, the Web platform creates course resource areas for each class so faculty members can provide class links and make syllabi and class notes available to students before classes begin.

Another major outcome: "We have seen a spike in the number of faculty interested in taking advantage of Web-learning tools since the implementation," said Phillip Sbaratta, NSCC's assistant dean of academic technology and distance learning. "Once they become comfortable with the portal and its functionality, it's a short hop to teaching a Web-assisted or fully online course. The impact of the portal is greater connection between faculty and students and a focus on curriculum transformation."

For more information, visit ***pyramid.nscc.mass.edu.***

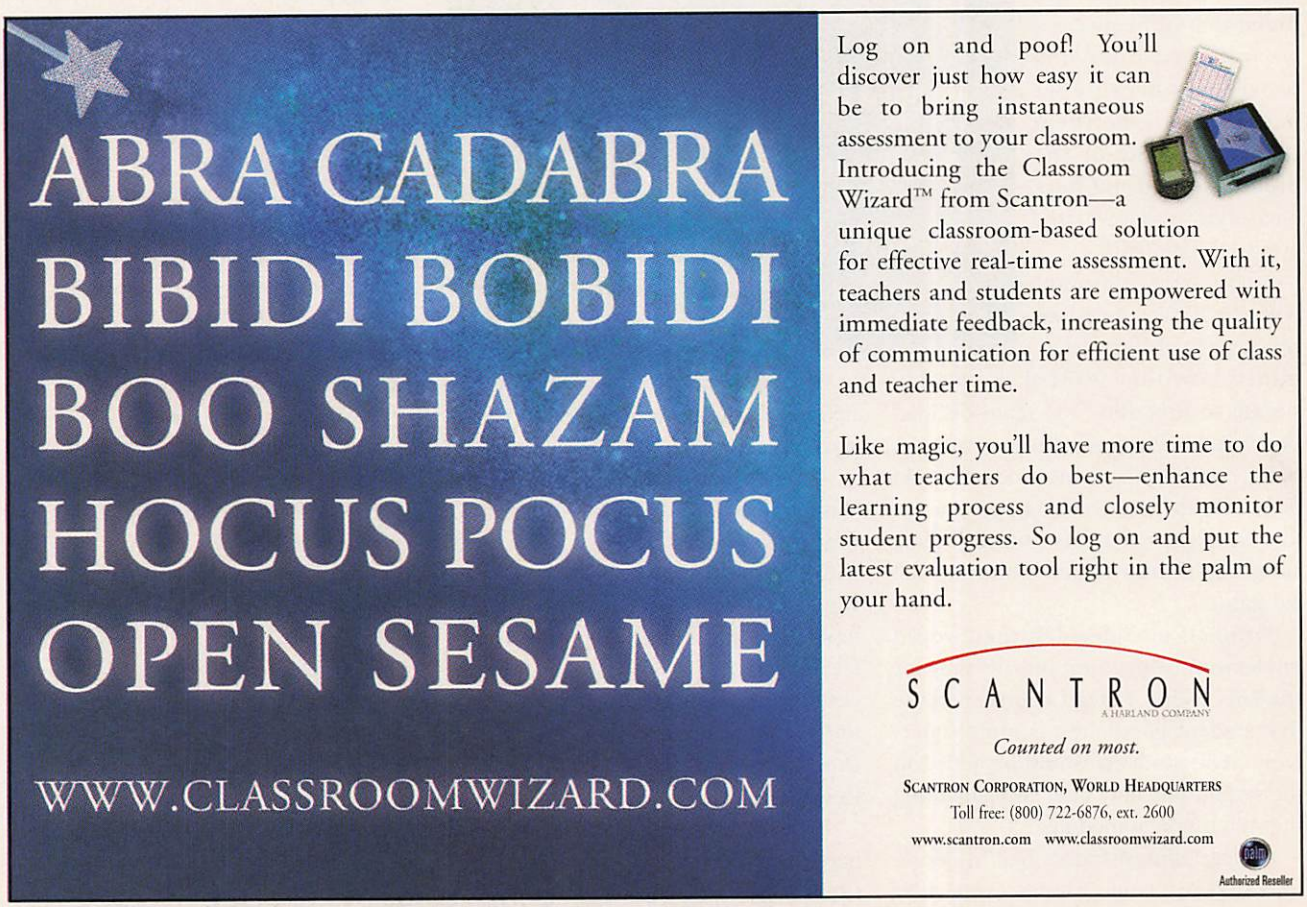
Sign Here: Digital Certificates Simplify University Business

Digital certificates, the electronic equivalent of a handwritten signature, have been legal and available since 2000, when President Clinton signed the Electronic Signatures in Global and National Commerce Act. Digital signatures allow an organization or individual to transmit legally binding documents via the Internet with embedded signatures that are guaranteed to be authentic. They are in use in various everyday applications: You use them without even realizing it when you order a product from an online retailer or verify your identity to your bank in an online transaction. Digital signatures used in place of hard-copy signatures save time and money and reduce red tape.

Like commercial institutions, universities have a vast number of appropriate uses for digital certificate technology. Using digital signatures allows a university to conduct the grant writing and management process entirely online. Digital certificates also ensure that highly confidential research data can be sent from one institution to another securely. They can facilitate human resource administration, student services, and curriculum management. Most colleges and universities, however, are only beginning to explore the uses of digital certificates.

At the University of Alabama at Birmingham (UAB), administrators are conducting pilot programs as they lay the groundwork for the installation of digital certificates in all twelve UAB academic and health sciences schools this summer. According to Clair Goldsmith, vice president for information technology at UAB, the rollout will occur in several key areas, beginning with intellectual property management. Says Goldsmith, "Using digital certificates, we'll be able to manage the patent application process, delivering applications that are legally binding, encrypted documents."

Next in line is the benefits department, which will use digital certificates for several purposes, including allowing employees to sign benefit documents via the Internet. "This will allow us to give better customer service to our new hires," says Goldsmith. "Now employees won't have to travel to campus to fill out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forms before they begin work here." He adds, "Everyone will have access to the forms around the clock, instead of just during business hours."

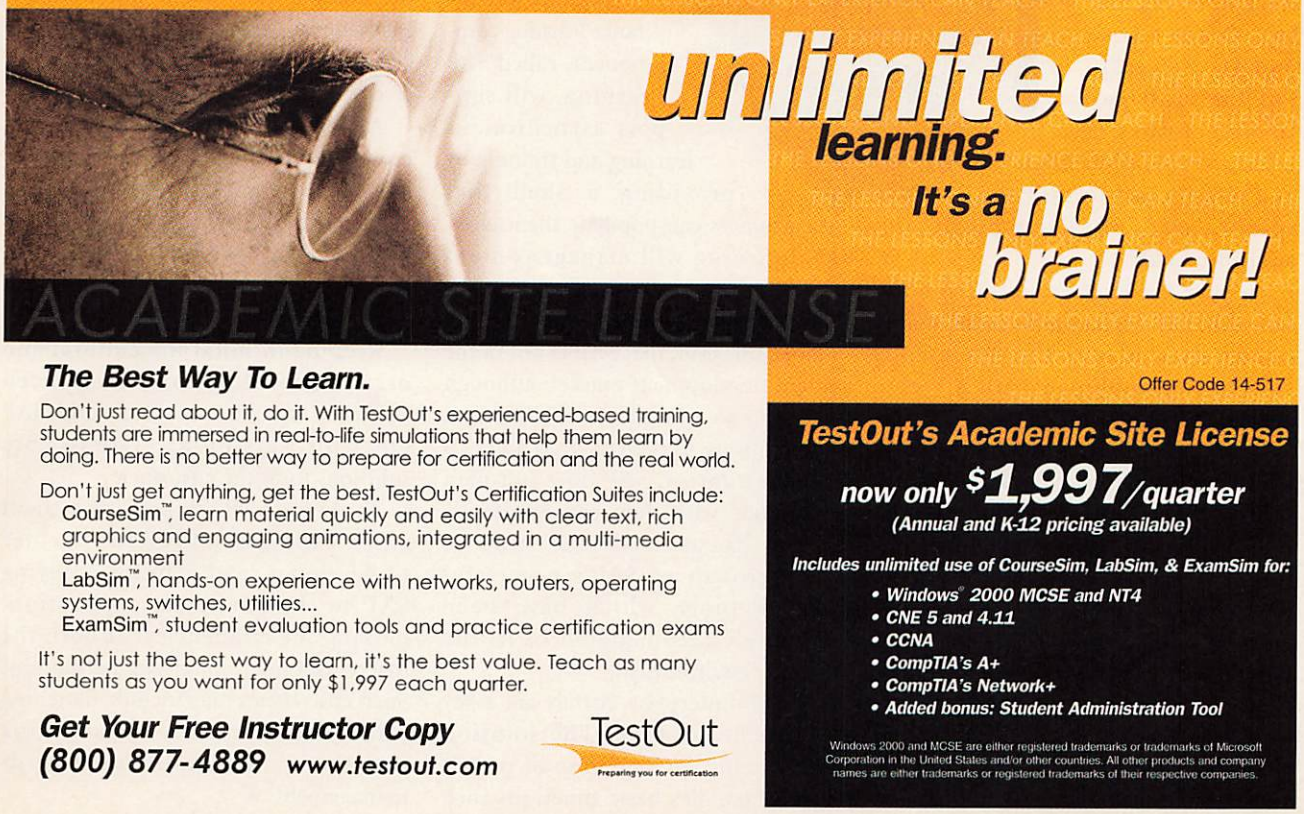
UAB, along with three other universities, is working with the National Institutes of Health to develop a system for delivering digitally signed documents between the university and the federal government. UAB is also developing a model for grant writing across the campus, which will allow the university to submit and manage all of the institution's grant forms digitally. Eventually, even student services will make use of the certificates, when financial aid, registration, and other functions participate. Students will have secure access to campus services from their dorm rooms.

UAB is using the services of TrustID from Digital Signature Trust Co., which claims to be the world's premier provider of digital identification solutions for secure online transactions. But how does digital certification differ from simply delivering a document from one address to another? Unlike a non-certified document, documents that have digital certification come with an assurance that the sender is who he or she claims to be. Doing this requires pairing a set of keys, a private key and a public key, which come together to verify a person's identity. One key is used to encrypt information and the other to decrypt it. The digital signature company holds the public key and fits it to the private key when the user puts it into the system. The dance that they do is called "symmetric key infrastructure."

Although digital certificate providers rely on varying levels of authentication or steps to getting a key, the process is similar regardless of the company. Users get a key after a series of verification processes are completed. For instance, a professor might respond to a questionnaire. Then she would appear at a designated time with two forms of picture identification in hand. The physical appearance combined with the personal information she has provided would authenticate her identity, at which point she would receive a key. Every time she wanted to use her key after that point, she would have to verify her identity using some sort of password or other device.

UAB will have its digital certificate program up and running by mid-2002 and hopes to complete the process within a year.

For more information, contact ***Clair Goldsmith*** *at* ***c.goldsmith@uab.edu.***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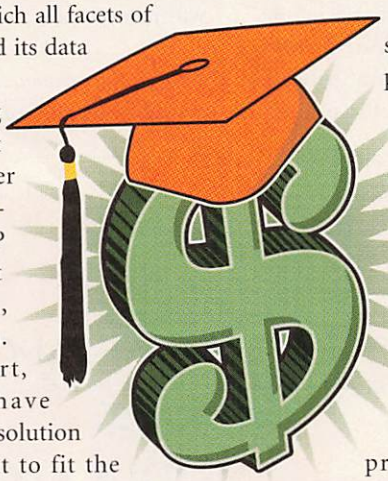
FEATURED PRODUCT

MySAP: ERP for Education

Enterprise resource planning, also known as ERP, is an administrative management system that integrates all facets of a business—planning, human resources, payroll, accounting, and marketing—on a common software platform. On a campus, ERP would also include curriculum tools and student services.

Although these functions are often handled by separate campus systems that don't necessarily communicate with one another, ERP provides an integrated solution within which all facets of an organization and its data can interoperate.



Most of the big ERP firms market products for higher education, including SCT Corp., SAP AG, PeopleSoft Inc., Oracle Corp., and JD Edwards. For the most part, these vendors have taken a corporate solution and refashioned it to fit the specific needs of the nonprofit academic sector.

In mySAP Higher Education & Research, SAP's solution for colleges and universities, a core ERP back-end solution is combined with a Web-enabled front end called mySAP.com. The core comes from SAP's solution for business and industry, and includes customer relationship management, e-procurement, financial accounting, business intelligence, and human resources. SAP anticipates moving the entire product onto the Web at some point, ultimately offering customers a choice between the traditional setup and Web-based service.

MySAP Higher Education & Research integrates with SAP's standard business operations tools to support research, teaching, and learning, as well as core campus administrative functions. According to Malcolm Woodfield, president of the SAP Public Services Business Education unit, SAP plans to roll out three components of mySAP Higher Education & Research in 2002: campus management, distance learning tools, and grants management.

Campus management enables student application processing, timetable and individual study plan development, class registration, and self-service portals. This product also supports curriculum development and provides tools for exam preparation and student assessment.

The new distance learning component, called SAP Learning, will support asynchronous learning and training by providing a shell that customers can populate themselves. SAP Learning will manage content delivery, course auditing, fees, registration, and add/drop functions.

Note, however, that SAP is not in the content development market; although its systems can work hand-in-hand with content platform providers to integrate content, SAP does not plan to compete with their content development focus. SAP Learning is an outgrowth of SAP's successful training tools, which have been completely reconsidered to fit the academic environment.

MySAP Enterprise Portals are a key part of the package. The solution simplifies the configuration of portals and also handles basic functions such as registration, security, personalization, and incorporation of content and services.

The solution uses role-based access, enabling entry only to those systems for which one has authorization. For instance, role assignments permit students to plan their spring course schedules, but not to access the schedules or grades of their classmates.

MySAP also provides tools for managing grants and facilitates project management, forecasts the required resources, and ensures that projects follow their intended schedule. Program management is integrated with the financial accounting and reimbursement functionalities so that everything tracks together.

So far, the majority of SAP's clients in higher education have been at top-tier schools such as the Massachusetts Institute of Technology, although the company says its market share at all levels is growing.

Along with its position in the commercial market, SAP touts its customer service record in higher education, claiming that all of its implementations in colleges and universities have come in on time and under budget.

Keeping in mind the cultural and organizational differences between academia and the corporate world, SAP looks for ways to integrate its core solutions to fit the customer.

To do so, SAP works with a client and a business consultant partner to develop a road map for applying SAP to the particular institution, looking for efficiencies, at both the macro and micro levels, along the way. Such efficiencies may include flattening internal hierarchies, streamlining processes, and simplifying records management.

Blue Martini Web Portal: An eCRM solution for Higher Ed?

By Susan Empey, Stanford University

With millions of pages of information readily available on the Web, it has become difficult to find information that we really need. The goal of Stanford University's Enterprise Portal is to provide a managed entrance to this plethora of information that is not only customized for users upon their arrival at the site, but can then be further personalized by them to better suit their individual tastes and interests.

The external Customer Relationship Management (eCRM) application suite from Blue Martini Software provides a powerful portal development toolset, which allows higher education institutions to deliver Web content to campus constituents in new and highly targeted ways. Information and services can be targeted to an individual user based on his specific role in the higher education environment (faculty, undergraduate, graduate student, staff, alumnus), and then further personalized by the user once he logs on to his customized portal site.

Why eCRM?

Blue Martini's offering is not an ERP (enterprise resource planning) solution, but a way to deliver access to targeted information and tools. Not surprisingly, the company's eCRM application suite in the past has been tailored to the e-commerce environment, supported by marketing statements such as "improve your return on investment, increase revenues, up-sell or cross-sell your customers." In short, it has been marketed as an electronic tool for a company's sales and marketing arm. Indeed, eCRM sounds much like a high-tech term one might expect to hear from a Silicon Valley company. So why would Stanford—one of the most prestigious higher education institutions in the country—also be interested in such a product?

Stanford's interest lies in the fact that these same tools used in a higher education setting allow the university to segment its population into granular groupings and deliver content that specific groups want and need. This targeted content can help these groups become better informed and engaged students or alumni, or teach or work more effectively within a complex university environment.

For instance, by integrating Stanford's own secure electronic log-in capabilities (Kerberos Web authentication) and by using Lightweight Directory Access Protocol (LDAP) to retrieve information from the central university information repository and other campus database systems, we can ascertain that a user is, for example, an undergraduate student, living in Branner residence hall, majoring in English, currently enrolled in Literature 342, and a member of both the varsity football team and the drama club.

Armed with this information, the Blue Martini architecture enables us to provide that user with Web content regarding undergraduate life on campus, Branner hall's meal plan, updates from the English department, the online syllabus and class assignments for Literature 342, the varsity football practice schedule, and the next scheduled meeting of the drama club—all without the user having to search for it!

Stanford's IT staff evaluated several software packages as potential solutions for our portal infrastructure needs. However, Blue Martini's open architecture, personalization features, and application program interface offerings allowing for ease of interface with other applications quickly moved it to the top of the list. Some more traditional portal software applications offer more templates to follow for design success, but with this also comes a smaller set of design options. Blue Martini's high level of flexibility, along with its strong content management capabilities, is what sold us on the product.

Implementation and Maintenance

Blue Martini's eCRM solution is both powerful and customizable, but this comes with an appropriate price tag that is not insignificant, even to a large institution. Because the products cover so much ground—from content management to call center management—they are licensed in a modular format. You will need to take the time to thoroughly research which modules you need to license and focus on exactly how you intend to use these modules.

Additionally, Blue Martini is not a plug-and-play software package that you can have up and running with the help of a couple of technically savvy staff members within a few days or weeks. It is also not the kind of package that you can successfully implement without the assistance of Blue Martini's own consulting staff, or a third-party implementor.

At Stanford, we were able to implement the basics of a nice-looking, well-

organized, and fully functional portal within about a four-month time period. This was accomplished with many months of pre-planning and with an in-house team of approximately 15 people (at various levels of effort)—including programmers, integration experts, and design, testing, and user interface experts (along with various management and advisory groups)—working side-by-side with a staff of approximately seven external consultants.

Making any design or structural changes after initial launch will require someone not only knowledgeable of J2EE technology, but familiar with Blue Martini's own architectural structure, coding schemas, and content delivery mechanism as well. However, Blue Martini's architecture does provide an easy-to-use-and-understand system of information assortments and folders for setting up and managing content structure. Additionally, it has been our experience that the company is also still small enough to provide good, timely technical support when needed.

One of the nice features of Blue Martini is that it is set up to accommodate constantly changing information so that new content and features do not have to be bundled together into one major release but can be released as soon as they are tested and deemed ready for publication. Another good feature is that the provision of simple dynamic content can be accomplished quite quickly and easily via an easy-to-use Web interface. Further, someone with little technical knowledge can set up this interface for decentralized content provision.

This ease of decentralized content provision has proven to be the key to Stanford's implementation success. As is likely the case at most higher education institutions, there are only a few key centralized data repositories and many smaller databases of information, which individual schools and departments have set up and maintain. These decentralized content providers, then, will have a variety of needs in terms of providing content to our portal system. The Blue Martini structure allows us the flexibility of receiving information in a variety of formats, including Extensible Markup Language, HTML, and plain text format. Blue Martini also offers a PeopleSoft Inc. adapter that we plan to implement to ease the transfer of data from this key system. Because the usefulness of any portal is expressed in terms of not only the information that is provided but the timeliness of that material, having a variety of data submission methods helps us achieve this goal.

Summary

Blue Martini has the potential to become a useful and powerful portal development tool for institutions of higher education. As with any enterprise software application, a learning curve does exist, but the flexibility and extensibility of the Blue Martini solution allows it to move from the e-commerce area to the education marketplace without significant effort.

I would recommend this product to higher education institutions that are looking for a way to provide targeted information and services in a decentralized fashion. You will want to do your homework before jumping in with both feet, but I think you will be pleasantly surprised at the breadth of possibilities Blue Martini affords.

***Susan Empey** is director of the Enterprise Portal at Stanford University.*

Product Round-up: Firewalls

Whether a campus computer network is large or small, it needs security that blocks unauthorized access and intrusion. On large networks, the increasing diversification of network activity—including wireless access, telecommuters, and virtual private network (VPN) connections—complicates the issue. In order to ensure security, therefore, it's best to implement various solutions, including antivirus protection, intrusion detection software, and firewalls.

Firewalls are the front line of defense, the border guards against unauthorized movements of users into or out of the network. Firewalls don't analyze messages but instead simply prohibit access to anything that doesn't meet specified criteria. There are many kinds of firewall products: personal firewalls, which reside on one specific computer, as well as enterprise-level network firewalls. Software firewalls are less expensive and more available than hardware solutions. However, hardware firewalls are always on and don't interfere with other software running on the computer. We've surveyed several of the top enterprise firewall products in this issue, from Microsoft Corp. Windows NT products to Linux and Apple Computer Inc. Macintosh devices.

For Windows NT

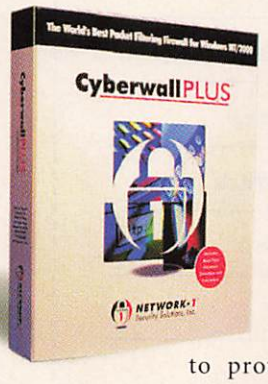
CiscoPIX

The Cisco Systems Inc. Secure PIX 500 series is one of the leading Windows NT firewall products on the market. The series encompasses five models scaled for a variety of customer needs and network sizes, from the enterprise market all the way down to the small office environment. At the enterprise level, the PIX 535 provides a throughput of 1 gigabit/sec with the ability to handle up to 500,000 connections concurrently. Administrators of a smaller network may prefer the PIX 525, which delivers 370 megabits/sec and 280,000 simultaneous sessions. Each model has built-in IPSec encryption, allowing both site-to-site and remote access VPN deployments for off-campus users. Each model features an easy-to-

install, integrated hardware/software appliance that uses a non-UNIX, secure, real-time, embedded system. The PIX firewalls may be managed by the PIX Configuration Manager or centrally managed by the Cisco Secure Policy Manager, which can manage up to 500 PIX firewalls, integrated software deployments, and site-to-site VPN installations. Contact: Cisco Systems, Santa Clara, Calif., (800) 553-NETS, ***www.cisco.com.***

CyberwallPLUS

Designed to protect Windows NT/2000 systems and enterprise computer networks, the Cyberwall system consists of a central management system (called CyberWallPLUS-CM) and a family of four firewalls that secure desktops, servers, Internet access, and enterprise networks. Cyberwall's approach layers a packet filter firewall and packet inspection with an active intrusion protection system. This combination gives the administrator fine-grain access control at the host level. CyberwallPLUS features pre-configured security templates that help administrators install the product quickly, regardless of their security experience level. The workstation version of the product also includes the ability to limit or forbid access to particular applications, such as Napster or Doom. Contact: Network-1 Security Solutions, Waltham, Mass., (800) NETWRK1, ***www.network-1.com.***



Symantec Enterprise Firewall 6.5

Symantec Corp. Enterprise Firewall (formerly known as the Raptor firewall) features a unique hybrid architecture designed to provide transparent firewall protection without slowing approved traffic. Its support for a broad selection of user authentication methods such as RADIUS, digital certificates, Lightweight Directory Access Protocol, and NT domain authentication gives administrators the flexibility to use existing security databases in the users' environment. Symantec's product is, above all, flexible. Users can choose between a hardware- or software-based solution for high availability and load balancing as well as integrated Web and Usenet content filtering. Developed for the Windows NT/2000 and Sun Microsystems Inc. Solaris platforms, Symantec touts an intuitive interface and range of easy-to-use tools for configuring, managing, and maintaining the firewall. From a central console, administrators can manage security policies for both local and remote firewalls and obtain a variety of security logs and management reports. An optional Symantec Enterprise VPN (formerly called the PowerVPN) can be combined with a personal firewall product and the Symantec Enterprise Firewall to extend the corporate perimeter to provide secure, low-cost connectivity for remote offices and telecommuters. Contact: Symantec, Cupertino, Calif., (408) 517-8000, ***www.symantec.com.***

SonicWALL GX 2500 and 6500

The SonicWALL GX 2500 and 6500 Internet security appliances deliver an integrated security solution, combining a high-bandwidth firewall and VPN hardware for large enterprise institutions. With application-specific integrated circuit security architecture, ICSA-certified packet inspection technology, and the inclusion of 100 VPN clients for secure connectivity of dial-up users connecting from off campus, the GX products compete with other firewall packages in this class. Administrators can manage the GX 2500 or 6500 using a variety of local and remote options, including CLI, a Web management interface, and Simple Network Management Protocol. Also included is SonicWALL ViewPoint, a Web-based, graphical reporting tool for managing and monitoring network security. For mission-critical security, users can install two SonicWALL GXs, as primary and secondary appliances, creating a redundant pair. There is even a built-in redundant power supply. The scalable design accommodates future upgrades and interface types. The product supports seamless integration of other SonicWALL security appliances, such as Network Anti-Virus and Internet Content Filtering, to provide all-in-one security. Contact: SonicWALL, Sunnyvale, Calif., (888) 222-6563, ***www.sonicwall.com.***

For Mac OS X

DoorStop Server Edition

Open Door Networks sells two products that work in combination to provide security for Macintosh-based servers. The first, a firewall called DoorStop Server Edition, includes advanced, server-specific security features and is specifically intended to run with such servers as AppleShare IP, WebSTAR, and ShareWay IP Professional. The second, Who's There Firewall Advisor, works with DoorStop to analyze each attack. Who's There provides administrators with critical information, including access attempts by service type and accessor IP address, built-in information about the most common attacks and their applicability to the specific Mac OS environment under which Who's There is running, and an automated "Whois" lookup to determine details of the accessor's network. The system can also automatically draft an e-mail that can be used to notify the administrator of the access attempt and provide him or her with details that may be useful in tracking the attempt. Who's There works with DoorStop as well as Symantec and IPNetSecurity products for the Macintosh. Contact: Open Door Networks, Ashland, Ore., (541) 488-4127, ***www.opendoor.com.***

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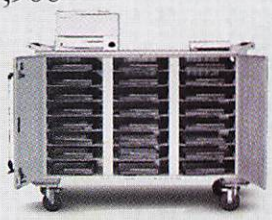

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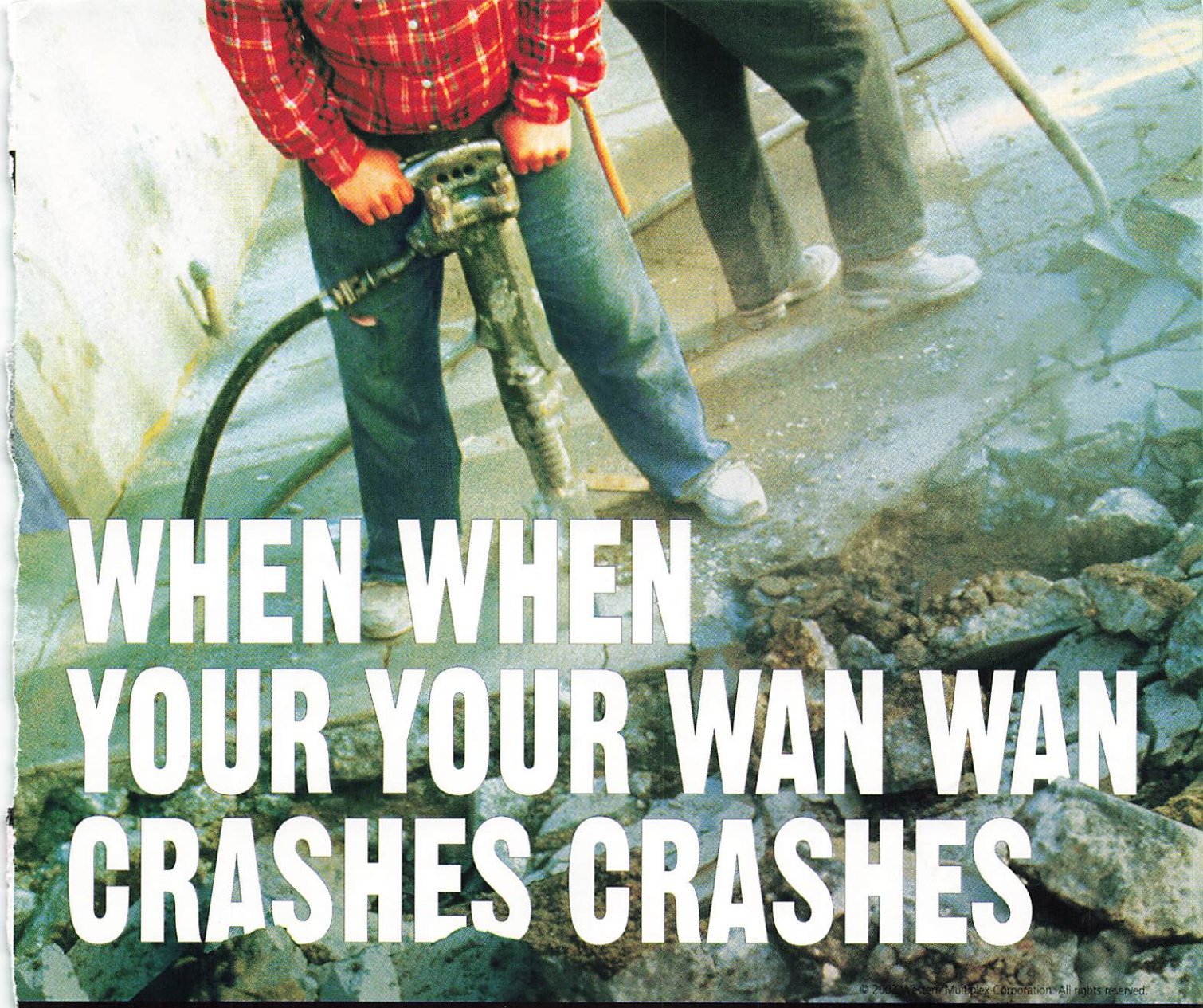

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